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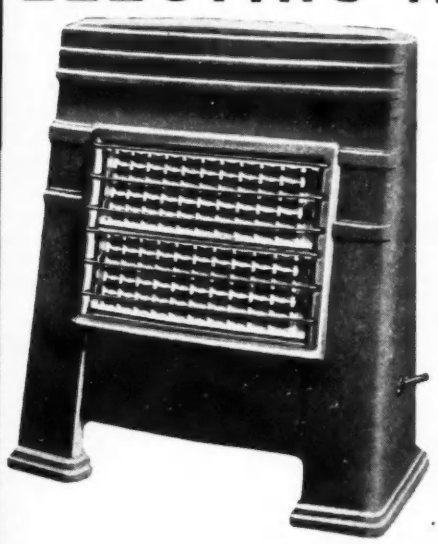

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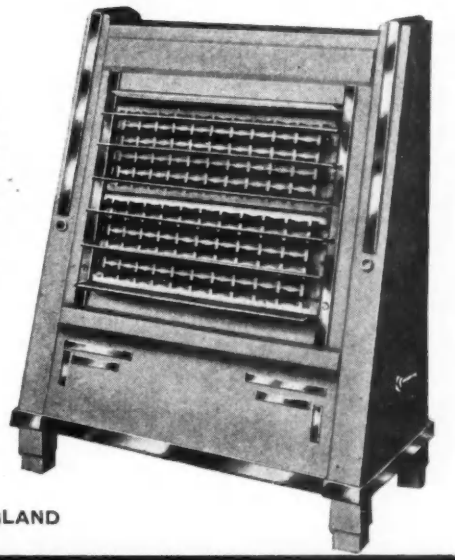

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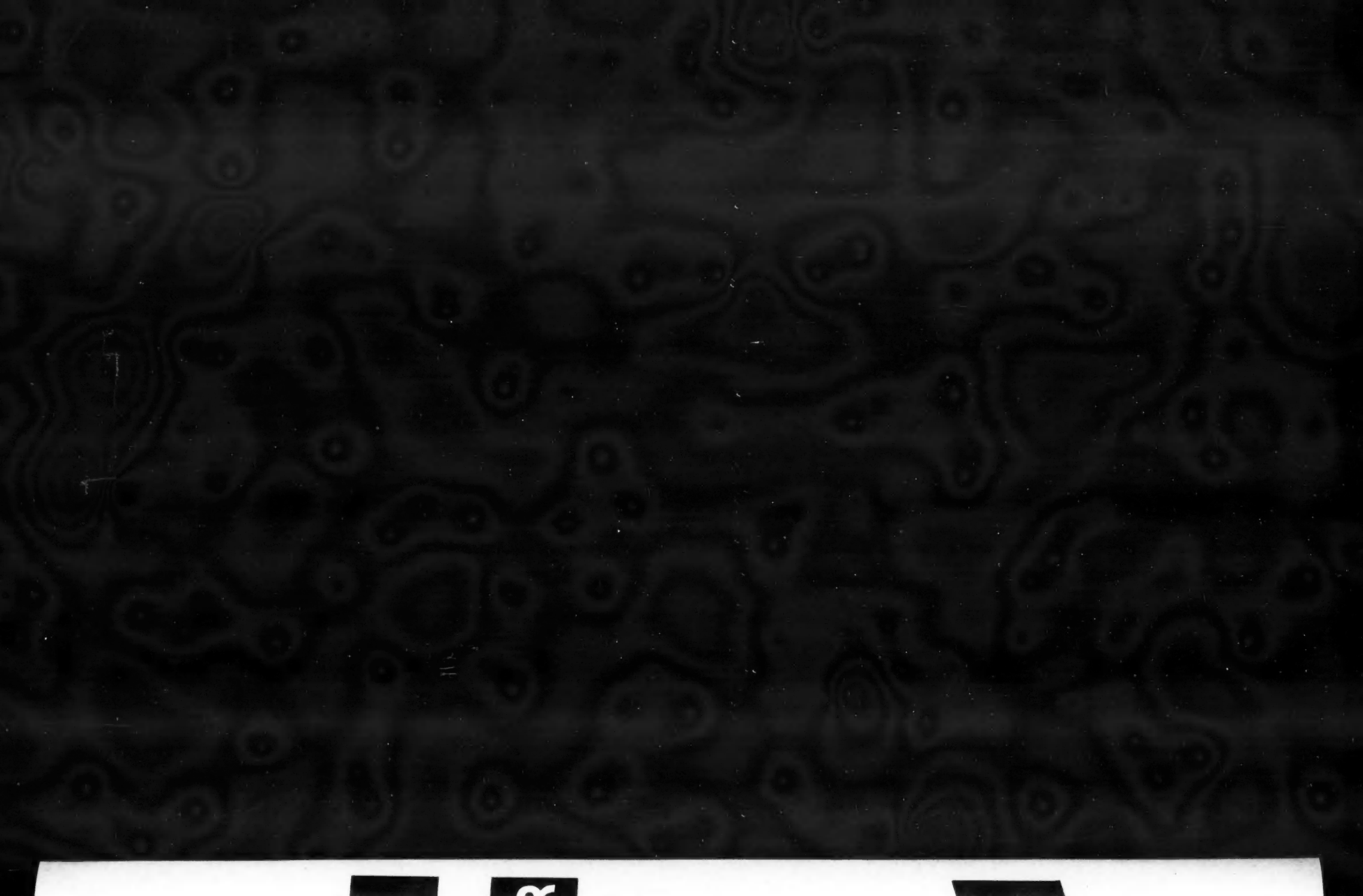

The
Electrical Review

VOL. CXVII. OCTOBER 11, 1935. No. 3020.

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The Great Domestic Advance

THOUGH in recent years the subject of domestic electrical applications has been one of continuous interest from January to December, it receives special emphasis in the early autumn, when our 6¼ million consumers are in the habit of adding to their household installations.

The additions made represent a very large turnover of products for the manufacturer, and substantial sales for the trader, the contractor and the supply authority. It is reasonable to suppose that every household buys something new every year and will continue to do so.

In accordance with our usual custom we have devoted the larger part of this issue of the ELECTRICAL REVIEW to descriptive information concerning the various apparatus and appliances that are available. The matter will be useful to every reader for some purpose or other, but it is particularly intended to enable all connected with this growing branch of the industry to have it at hand in a form suitable for ready reference during the next few months.

This year the issue very appropriately appears at a time when the electricity supply industry is occupied with the million-more-consumers effort organised by E.D.A. If one calculates only a modest outlay by, or on behalf of, each of the anticipated million, one visualises new business of this kind alone running into many millions of pounds. This, of course, will be above and beyond the installation extensions already mentioned.

It is almost inconceivable that anybody electrical can be other than optimistic regarding the future domestic load in any civilised country, though there are some people who fear that after the great building activity of recent years saturation point in home building is near at hand.

How little justification there is for this opinion is shown in a very useful article from the pen of Mr. Howard Marryat, entitled "Serving Small Dwellings," which appears on page 465 of this issue. Not only does the author hold that there will be no falling-off in new work, but he forecasts, on the basis of census returns and the requirements for making good the shortage of separate habitations and for carrying out slum-clearance operations, a vast increase in the rate of construction—a million new houses in England and Wales and 75,000 in Scotland during the next four years.

The economical provision of electrical labour-saving devices for these and other properties is part of the work that lies before readers of this journal. Mr. Marryat sees the occupants of two rooms in a slum moving to a cottage or a flat, a change which means added labour and makes desirable the provision of electrical service, whether it is used at once or not.

The minimum of wiring arrangements at first, allowing for new uses with facility as required, is advocated for all such cases; but the writer touches many other points that are deserving of the careful attention of authorities, architects and builders engaged in new building operations of various classes.

If further encouragement is needed this article, by a most competent observer, certainly provides it. And the other articles in this issue demonstrate that British electrical manufacturers are exercising all their resources and ingenuity to meet and stimulate the inevitable demand.

Boosting Electricity

SHORTLY after our leading article of last week was passed for press we received detailed particulars of E.D.A.'s national advertising compaign which is now in progress and may cover a total period of nine months. The information has been for some time in the hands of member undertakings, who we hope will rise to the occasion and co-operate fully with the organisation, but interest is far from being confined to these. It is an ambitious and well-planned cam-

paign and should attract non-member undertakings so that they may be induced, in their own interests, to join in what is the biggest national drive by our electricity supply interests. If member undertakings make an appropriation of one per cent. per annum of their revenue for publicity purposes and back up the Association's effort with suitable local Press advertising, £250,000 worth of such publicity will appear before newspaper and magazine readers during the nine-month period. This should satisfy the most persistent advocates of this form of advertising, while it will also be an excellent preparation for the other equally ambitious activities which are in contemplation. Obviously E.D.A. has a very big piece of work in hand, for its other duties are innumerable, but we are confident that the Council, Mr. Cramb, the director, and the experienced staff will be quite equal to the task that lies before them. We wish that it had been started a year ago, but we will waste no words in vain regrets, thus leaving ourselves space to congratulate those responsible for the scheme and to wish the organisation staff a full measure of success in its efforts to bring the claims of electricity before the million more.

Extensive and Intensive

FIGURES relating to the average kWh used per consumer served a useful purpose in the early stages of domestic electrification as showing what development was possible among those using electricity. Particulars quoted by Mr. A. E. McKenzie at last Saturday's E.P.E.A. dinner seem to indicate that the time has come when kWh sold per residence in an undertaking's area, and not per consumer, should be the " yardstick " for measuring progress. In Wimbledon the annual consumption is 1,055 kWh per house (whether connected or not), and while not many areas have so affluent a population, the records of undertakings in the East End and in industrial areas show what can be done under less promising conditions, and also that the extent to which electricity is used in an area is more important than results from selected consumers in that area.

Electric-discharge Lighting Progress

ALTHOUGH its colour is still not all that could be desired, the electric-discharge lamp, by its overwhelming superiority as an illuminant, continues to be adopted by street-lighting authorities. In the areas covered by the County of London Electric Supply Co. and its associates, particularly, rapid strides are being made. Having successfully overcome gas competition in Lewisham about two years ago, the County group has installed this system of lighting in many miles of streets. Last week we recorded a further twenty miles in Lambeth and ten in Bournemouth. Other authorities in all parts of the country are replacing out-of-date systems (generally gas) by electric-discharge lighting. In industry, too, the discharge lamp is being used to an increasing extent, and no doubt one day, in a modified form, it will be employed for the lighting of the home.

Oil-Fuel Consumption

THE heavy-oil engine stations have put up some excellent technical performances during recent years, but how nearly does the 31 per cent. thermal efficiency (kWh. sent out) achieved by the best station last year represent the highest figure practicable? Tests carried out by Mr. W. A. Tookey on a 250-b.h.p. Brush Diesel engine give a full-load fuel consumption of 0.357lb. per b.h.p. hr. This, we believe is the lowest figure yet obtained for an engine within the range of our own records, which extend from 100 to 1,000 b.h.p. Allowing for losses in the electrical end, this means a thermal efficiency of well over 34 per cent. on kWh generated. Normally, of course, a power-station does not run continuously on full load. The average would appear to be not very much more than half, if we are to take as a criterion the fuel consumption of 0.39lb. per b.h.p.-hr. obtained by the engine on its half-load test.

Electricity and Railway Safety

THE report of the inquiry made by Lt.-Col. A. H. L. Mount, on behalf of the Ministry of Transport, into the railway accident at Welwyn Garden City last June has now been issued. It is recommended that the programme of reconstruction of passenger stock should be accelerated, partly with a view to its equipment with electric lighting, some of the coaches built before 1923 (and forming part of the trains in collision) being still gas-lighted. One of the fires that broke out was due to the setting alight of splinters by cinders from the locomotive, which indicates that electricity would be safer also for other purposes than lighting on our railways. The up-to-date locomotive carries no cinders for any purpose whatsoever.

Original Sin

A CURIOUS case of good service given by radically defective material is recorded in the Technical Report of the British Engine, Boiler and Electrical Insurance Co. During the opening up of a 1,000-kW 3,000-r.p.m. steam turbine for inspection the side of the disc and outer rim of a cast-steel velocity wheel (with a tip velocity of 600 ft. per sec.) was found to be riddled with blow-holes. One of these extended to the face of the disc, where a crack had become visible due to the scouring out of the slag by steam. A blow-hole at the rim had been originally filled by fusion welding and contraction cracks appear to have existed since the deposition of the weld metal at the time of manufacture, twenty-three years before, though presumably not visible then. Although the freedom from trouble owed something to good luck, the case illustrates the smallness of the variation in working stress of a turbine compared with that of a reciprocating engine, in which so high a concentration of stress would have caused early failure.

Asphyxiation?

As electricity cannot be stored in bulk, the two-part tariff has been introduced, largely in order to cover the standing charges on plant that is idle for most of the time. So successful has our industry been in making a merit of its main defect that the Gas Light & Coke Co. is following suit with a two-part tariff based on rateable value and number of rooms. This tariff bears little relation to the economics of production, but Sir David Milne-Watson is quite entitled to claim that it will lower the present cost of gas heating. What he is not entitled to claim is that gas at 8.6d. per therm is equivalent to electricity at from ¼d. to ½d. per kWh. We grant him that a therm contains the same number of B.th.u. as 29.3 kWh, but the low efficiency of application of gas has led to the rule-of-thumb method of dividing the price per therm by ten to give the equivalent price per kWh. There is plenty of margin between this and the ½d. rate to rule out nicer calculations of less or more. A large proportion of the heat from a gas fire goes up the chimney, so that only when used for asphyxiation can gas compete with electricity at such rates.

A Confession

THE gas industry is now claiming for its improved fires " 30 per cent. more heat," which prompts the question: What is their efficiency now? Even if we generously put it at 80 per cent., it means that during all these years the gas industry has been selling fires which gave out only about 60 per cent. of the heat energy which the consumer bought and paid for—a sad business!

Serving Small Dwellings

By H. Marryat, M.I.E.E., M.I.Mech.E.

The electrical equipment of working-class homes

[Elliott and Fry
Mr. H. Marryat

DURING the past fourteen years contractors have profited largely by the wiring of most of the one-and-a-half million new working-class habitations which have been constructed. This effort has added 17 per cent. to the number of homes available, and there are not lacking those who fear that saturation is about reached and that work of this class will shortly fail.

How far this is from the truth may be realised by a study of the census returns, for although in the period population has increased by only some 6 per cent., the number of separate families has increased by 17 per cent., so that nothing has so far been accomplished to make good the shortage of separate habitations for each family which existed at the close of the War. To the demand under this head must be added the new building necessary to deal with the slum clearance problem. The meeting of these requirements during the next few years must cause a vast increase in the rate of construction.

Programmes for rehousing submitted by local authorities in 1933 provide for demolishing 260,000 existing homes and providing 285,000 new dwellings. These figures should be compared with the actual achievement of 20,000 replacement houses since the War. Altogether during the next four years we may expect the construction of a million new houses in England and Wales and 75,000 in Scotland.

With this colossal prospect it is not surprising to find authorities everywhere devoting attention to new building methods, lay-out, accommodation and service; not the least important part of the last consideration is the economical provision of electrical labour-saving devices.

Larger Houses Mean More Work

A point which is often overlooked in dealing with rehousing problems is that in removing a family from one or two rooms in a slum area to roomy accommodation in a modern working-class flat or cottage, apart from providing more healthy conditions for every member of the family, one is also imposing more work upon the housewife. Not more than such a woman with nothing else to do can easily manage, but more than she has been accustomed to. It will interfere with her industrial occupation if she has one, or with her usual pastimes if she has not. As a result there is sometimes observable a tendency for the new, better and larger accommodation to drift back to a slum-like state from neglect by its occupants.

To counteract this tendency it is of importance when providing the woman with more and better accommodation at the same time to place at her disposal, so far as is possible, the means for maintaining her new home in cleanliness easily and cheaply. To a large extent this means electric service at the right price.

It is not necessary here to discuss tariffs. In most parts of the country generation and distribution costs justify a tariff which will enable electricity to compare favourably with any other service, and where this is the case it is surely the due of the working-class man who cannot be expected to pay for the luxury value of electric service as compared with its more cumbersome and dangerous alternatives.

Granted a satisfactory tariff, we have still to deal with installation costs. An economical layout and method of wiring are essential. Here we have to consider cost, safety, flexibility, adequate provision for extension, appearance and maintenance. Provision must be made for lighting, heating, cooking and hot water, with the possibility of adding a washing machine, vacuum cleaner, electric clocks, wireless and other conveniences.

To wire for all this in the first place in every house would be a costly matter, and probably unnecessary; the scheme should therefore be such that, whereas minimum requirements are immediately available, no disturbance or excessive expense will be involved in providing a complete equipment.

In Tenement Buildings

It has been shown that for blocks of tenement buildings beyond a certain height the provision of flues for coal fires is in any case too costly and absorbs too much habitable space, so that electricity or gas must perforce be installed with heaters and a hot water supply, if a central system is not adopted, and there would appear to be everything in favour of electricity for this service.

Here it should be mentioned that a system of central heating and hot water supply, in which the latter is automatically rationed in a quantity of 30 gals. per day per flat, supplied at a temperature of 150 deg. F., is recommended by the Council of Research on Housing Construction, and would appear to be the most satisfactory solution of the problem. Where such a system is adopted every effort should be made to secure that the boilers are electrical.

Where the choice of a system of heating and hot water supply is left to the tenant, he should not be faced with any difficulty owing to a lack of socket outlets. These should be provided in every room, and by fitting back to back need not involve any serious expense. In designing the capacity of circuits thus wired, the engineer might well take the special circumstances into consideration and depart from the letter of the I.E.E. Regulations to the extent of adopting a suitable diversity factor on the heating circuits, calculated to allow for the maximum total heat ever likely to be required and afforded, and if necessary, rely upon controlled cut-outs to protect the circuits against any dangerous overload. Risers and mains should also be subject to a liberal diversity factor, and, in addition, be so installed as to allow of ready multiplication to meet increasing demand.

A tenement usually consists of from three to six rooms and bathroom. In cases where the latter is combined with the kitchen where other electrical apparatus is fixed, the precautions laid down in the Regulations for bathrooms in general become vitally important and cannot be relaxed with safety to the slightest degree. There should be a fixed lighting point, a 2-A socket outlet, and also a 15-A socket outlet in each bedroom and the parlour.

In the kitchen provision should be made for the connection of a cooker, and separate provision for a water heater, also a socket outlet which may be used alternatively for a kettle or washer. It is not suggested that all this provision will be employed, but it is found that where it is not made demand does not arise, and that where it is demand follows, to the satisfaction of all parties.

The Method of Supply

The layout of wiring for a block of working-class flats presents a number of alternatives. The system generally adopted is to run a rising main up the centre of the block, looping from one distribution board to another at each floor; from these floor boards separate leads are run to a service board in each flat. With this arrangement the maximum load permissible in any one flat is controlled by the size of the leads used, usually 7/.036, and whilst in a great number of cases this may be more than adequate for the demand of the tenant, in others, where water heating and other electrical amenities are called for, their supply may not be possible on account of the limited size of the service. To provide for this, the tubes in which the service mains are run should be of large diameter to allow the pulling in of larger leads.

An alternative layout would provide for a ring main originating from the main riser in the centre of the block, and passing round all the flats on each floor, or possibly ringing all the flats upon two floors. With the total capacity of copper no more than in the previous layout, a great diversity of consumption is then permissible, as 75 per cent. of the flats served might be taking only 50 per cent. of their normal capacity, allowing the other 25 per cent. to take up to 2½ times normal capacity.

Whichever system is adopted, in order to effect economy in installation, the horizontal runs from the main risers should be laid upon the brickwork of the party walls, one or two courses under the ceiling level of the floor to be served. The L.C.C. in its specifications favours these distributors being run at one course below ceiling level, because it adopts the system of a built-in box for each flat with an inspection cover opening flush into the flat and with a tube from this box to another built-in box, over the face of which the service board is fixed. By running the main tube two courses below the ceiling level, the two boxes referred to above may be conveniently combined, in which case provision should be made on the service board for part to be removable for inspection of the box without disturbing the service fittings.

A third alternative arrangement, and one much favoured in

some quarters, is to do away with the system of main risers for the whole block, and instead to bring the leads from the service boards in each flat situated one above the other, together in one tube to a convenient place immediately below in the ground floor or basement, where a board is fixed with connection to a horizontal main. This arrangement has a distinct advantage where the layout of the flats on various floors makes it difficult to run the horizontal services with direct connection into the service panel.

A further layout specified and demanded by some authorities requires the individual service of each flat to be brought back to a main distribution board adjacent to the supply undertaking's intake, where the supplies are individually metered. The inefficiency of this method from the wireman's point of view is obvious.

Cottage Installations

The wiring of cottages presents very different problems. Here again, subject to a suitable tariff, the number of outlets should be similar to that in the flats. In many instances the houses are already occupied, and in these cases the importance of working to the convenience of the occupants and of moving and replacing furniture without damage, and leaving all clean, cannot be over emphasised if the electrician is to retain a good reputation.

In occupied premises a surface system of wiring is usually essential. For this purpose tough rubber-covered wire is generally considered more durable than metal-sheathed, but has the comparative disadvantage of being more difficult to finish off neatly. Where a conduit job can be installed it is preferable and the extra cost, usually assessed at 5 per cent. for grip continuity and 15 per cent. for screwed, is only slightly greater than either of the other systems.

A debatable point is the position of socket outlets. There is much to be said in favour of placing these at 3 ft. or even 5 ft. above floor level out of the way of children who love to push hair-pins or nails into the tempting little holes. The economy of wiring socket outlets in adjoining rooms back to back need not be repeated, and yet this practice is seldom followed. The hall and parlour may sometimes be similarly arranged back to back with advantage.

The cost of separate services to a large number of separate cottages is so heavy that a simple system of distribution from a central point to a block or group of houses is always advisable, and the design should be such as to allow of easy extension to meet increasing demand.

Small Electrical Appliances

By Mabel G. Reading

Improvements that are needed

BECAUSE the electrical industry and the electrical Press are endeavouring to educate the public to become more electrically minded, it seems to me that the time has arrived to be constructively critical with regard to some of the smaller and (what we should all like to be able to call) universally used electrical appliances.

The "man in the street" is frequently quoted as worthy of our attention, and those of us who work in this progressive and important industry must realise that much has yet to be done to gain and maintain his interest, and to create the desire on his part to possess more labour-saving appliances. We have reason to congratulate ourselves on the rapid strides (as statistics show) that have been made in the sales of electrical energy; and also of larger apparatus such as cookers and water heaters, but in this article I am more interested in dealing with the smaller and less costly appliances.

It is safe to state that practically every home throughout the country where electric lighting has been installed possesses an electric iron. Unfortunately too many still possess little else besides that is electrical. People in charge of travelling showrooms and all demonstrators must realise the necessity of encouraging the housewife to install such appliances as the kettle, vacuum cleaner, floor polisher, clothes washer, toaster, waffle baker and coffee percolator.

During the last twelve months manufacturers have done much to improve the household iron, but a very necessary improvement, which I suggest should be universally adopted, is the use of non-kinkable flexible wire. Irons should always be of the automatic or signal type. The public should be guarded against buying cheap irons, and if all supply authorities and contractors could be induced to sell only British made irons carrying a five years' guarantee, and fitted with three yards, not less, of non-kinkable flexible cord and side-entry connectors, saleswomen and demonstrators would be able to tell a more convincing story, and purchasers would be certain to obtain the satisfaction which should accompany all electrical apparatus entirely from a service point of view. It is not difficult to persuade the discriminating public to buy what is recommended as the best iron on the market.

Kettle Design

As a utility article for use in kitchens and offices the quick-boiling automatic kettle is excellent, but there is little to recommend it from the point of view of appearance. If manufacturers would realise the necessity of introducing a kettle of pleasing design which would also be quick-boiling and automatic, I feel convinced that the demand would follow. For presentations and home entertaining, salesmen are unable to offer a kettle of suitable appearance.

The one serious drawback to the quick-boiling kettle incorporating the exposed immersion type of element is the deleterious effect of the hard water supplied in nearly all London districts, which very soon minimises the quick-boiling results. All kettles should be automatic because of the service they will give to the consumer, and also the story which the saleswoman can tell regarding the "kettle with the brain" which is almost certain to have the desired effect of clinching the sale.

[*Navana*

Miss Reading is head demonstrator and saleswoman to the City of London Electric Lighting Co., Ltd.

The vacuum cleaner as a labour-saving appliance should have a much greater market than it enjoys at present. Almost every householder, whether married or single, can afford a cleaner on the advantageous hire-purchase terms now offered. One improvement that all demonstrators would be happy to see would be some move towards elimination of noise; this has caused the loss of many sales, as housewives declare that they cannot hear callers when the cleaner is in use.

Many cleaners are also inefficient with regard to removing cottons from heavy pile carpets. All metal parts should be chromium plated to save unnecessary cleaning. When the dust bag is of the outside type and requires emptying, it should be possible to do so without soiling the hands. If these four points could receive some attention from engineers and manufacturers, and if demonstrators would be a little more enthusiastic regarding the performance of vacuum cleaners much might be done to speed up sales.

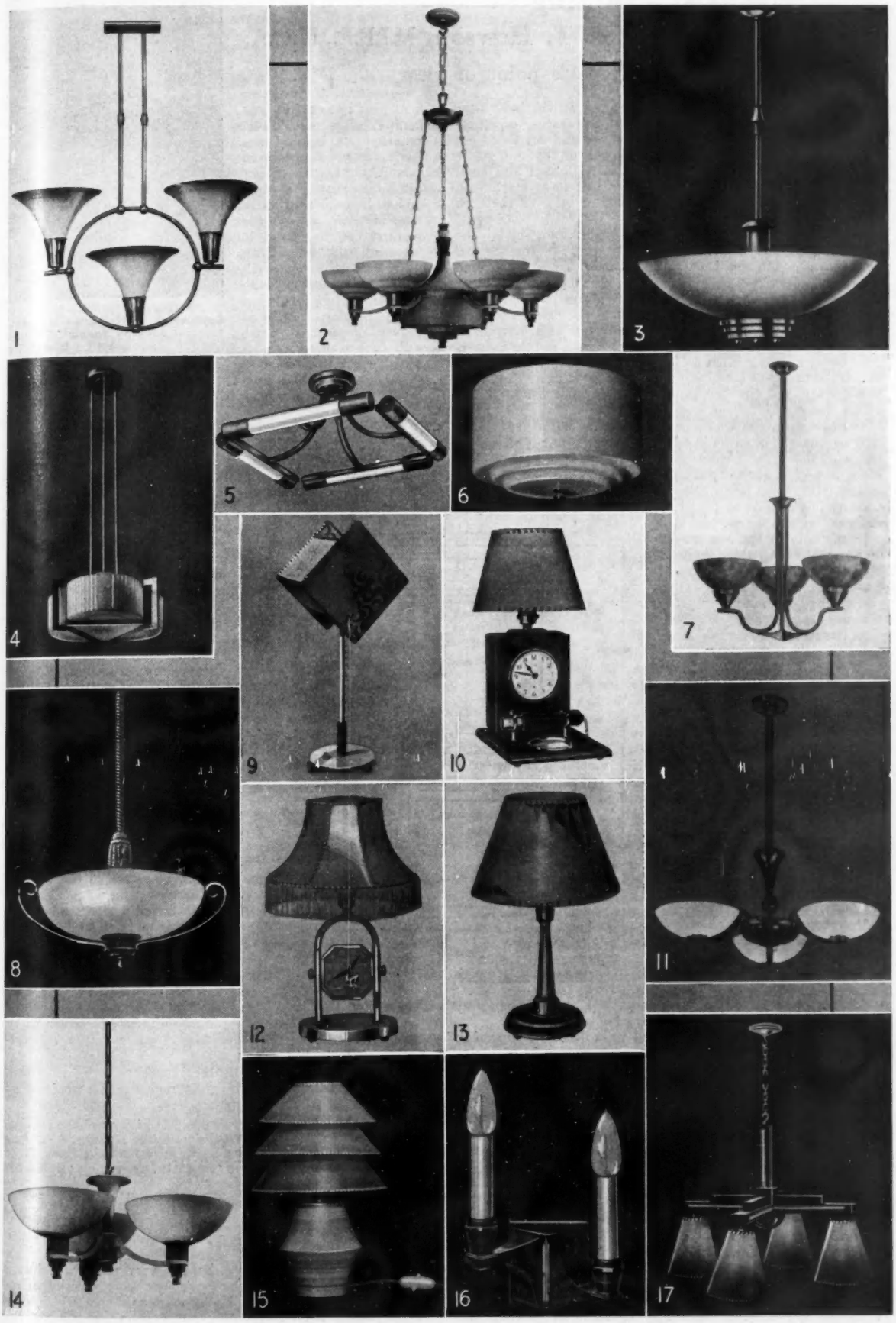
The Stokes-type cooker with its casserole, as a useful labour-saving appliance, should be demonstrated much more largely for use in the many blocks of modern flats that are growing like mushrooms all over London. In this three-roomed type of flat with the addition of a combined kettle and saucepan the bachelor owner could cook all that would be required with a minimum of expense and a large saving in time. This type of cooker may be used as a radiator, and on cold nights (with the lid of the casserole safely fixed) as a bed warmer.

Combined Kettles and Saucepans

The combined kettle and saucepan is a utility appliance which should be introduced enthusiastically by all saleswomen, as it has a two- to six-pint capacity and is fitted with a two-heat element. It serves the dual purpose of an ordinary kettle and also as a double saucepan for heating milk and soup, and for making porridge and custard. It should be recognised as another appliance of many domestic uses.

One of the housewife's troubles when using an electric cooker is to find the easiest and most economical method of cooking eggs, and practically all demonstrators have had to cope with this problem. The egg steamer which poaches or steams four eggs at a time is an efficient appliance, and eggs cooked in this way are more digestible and of a more appetising appearance than those poached in the ordinary manner. Demonstrations of all these appliances should have the desired effect of creating a much greater demand from the public.

(*Continued on page* 468.)



A Few Examples of Lighting Fittings for the Modern Home

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Electric Cooking

By F. T. Hewson, M.I.E.E., M.C.A.

From the cook's point of view

Commander Hewson is commercial cooking specialist to the London Associated Electricity Undertakings, Ltd.

DURING the last few years enormous strides have been made with electric cooking, the apparatus, especially boiling plates, having been improved and developed out of all recognition. It is no longer looked on by the public as a toy and has definitely entered the restaurant and hotel world. The object of this article is not to deal so much with design aspects but to present the point of view of the cook or chef.

Domestic cookers are divided into, roughly, two classes, the ordinary type and the thermal storage type. In the thermal storage cooker the heat is continually stored. Here the boiling plate consists of a large block of iron heated by an element; when not in use the heat is retained by means of an insulated cover. An additional element is fitted in the oven, a change-over switch being provided so that only one element can be employed at any given time. The current is in use for twenty-four hours a day, so that so far as the supply undertaking is concerned this type forms an exceedingly good load. No meter is necessary and the low loading reduces the cost of installation and service cables.

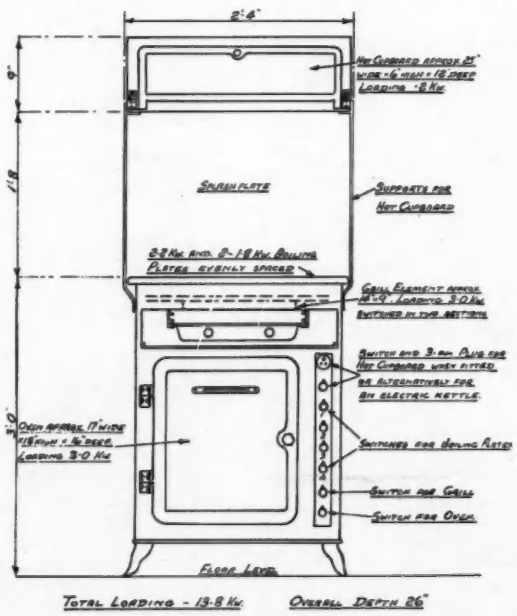
The consumer also knows exactly what his bill for electricity will be. On the other hand elaborate cooking cannot be carried out with this type of range owing to the lack of boiling-plate space and of a normal grill, the latter being inside the oven in the form of the heating element. This combination of grill and oven is also to be found in cookers designed for colonial use.

In my opinion the advantages of the larger grill thus obtained are counterbalanced by certain disadvantages. For instance, when giving a dinner party the fish might have a sauce which would require "glazing" under the grill or salamander; by this expression is meant the subjecting of the sauce, which would contain a large amount of butter, to a fierce heat for a few seconds in order to set it and give it a shiny surface. Here, let it be noted, it is most important to see that the sauce "glazes" instantly; otherwise it is liable to disintegrate and curdle. Possibly also the same menu may contain a soufflé, and it is obvious that a soufflé will not cook if the oven door is continually opened or left open in order to get at the grill.

A separate grill is therefore essential and should be of such a size that a ¾ or 1-lb. sole can be cooked without difficulty. In few of the domestic cookers of the ordinary type is the grill large enough to do the work with comfort and convenience, and it is decidedly annoying to have to cook the food in relays when one is in a hurry. This larger grill should be constructed in two sections in order to ensure economical working when dealing with smaller quantities of meat, &c. There would be no need for three-heat control as the grill would be used purely as such and not as a simmering plate. Two separate switches or one multi-way switch could be fitted so that either half or the whole of the grill might be used at will.

At least one radiant-type boiling plate should be provided; it is most annoying to come in late on a cold night when a hot drink is most welcome, and to have to wait while a solid plate attains the temperature necessary to warm up milk, &c. (I can hear someone say, "Well, install a separate milk warmer!", but this is not always practicable or economic.) Stored heat in the solid type of plate provides a higher working temperature once the plate is up to heat, and it is therefore better for continuous work, especially when full use can be made of the retained heat.

The vexed question of the hot-cupboard requires a great deal of thought. A separate hot-cupboard, independently heated, would be a great improvement in even some of the smaller cookers, always provided that the space available in the kitchen will allow for this. In so many buildings and flats the kitchen, although so important, is usually the last place to be thought of. The hot-cupboard as at present arranged depends to a large extent on the waste heat of the oven for its warmth, and therefore if one is cooking a meal on the top of the stove, plates are often not so warm as they should be. If they are placed immediately under one of the boiling rings the disadvantage is that in the event of a saucepan boiling over the plate nearest the boiling ring collects some of the liquid, which is then baked hard on to the china. It is annoying just as a course is being served to have to wash a plate when the rush of the service is at its height; added to this the grill as at present fitted takes up valuable space in the hot cupboard.



The author's ideal cooker

Therefore, it would be well worth fitting a separate hot cupboard loaded to about 200 W with a two-heat switch, which could be made removable and supplied or not as might be desired. In the case of hired stoves the small additional rental would hardly be noticed and would be more than compensated for by the benefits derived from this improvement.

The Complete Cooker

A cooker which would fulfil these requirements would therefore have the following equipment:—

Four boiling plates, at least one of which would be radiant, either of the transformer type with the secondary winding forming the heating elements operating at a low voltage or of the sheathed type operating at line voltage; it is not

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Small Electrical Appliances (*Continued from page 466*)

With the understanding use of some of the electro-medical apparatus which is available much unnecessary suffering in the home could be alleviated. The electric blanket and pad are invaluable in cases of lumbago, sciatica and other rheumatic complaints. There are also many uses to which the violet-ray and vibrator outfit may be subjected without the services of a professional masseuse, but it is absolutely essential that these appliances should be demonstrated in a practical manner to interest the casual visitor to the showrooms.

There are still a surprising number of people who allow their inhibitions to prevent their installing wiring in their home to obtain full benefit from the special domestic tariffs and from the reductions in cost that have recently been made in the prices of appliances.

Economic conditions have changed very materially during the last few years. When money was more plentiful salesmen did not require the specialised knowledge which they must possess to-day. Because consumers are entitled to the fullest information, both domestic and technical, it is expedient that only competent demonstrators and salesmen should be permitted to give that information. When salesmen are willing and able to study salesmanship from the customer's point of view, we may confidently expect business to be doubled.

proposed here to enter into the merits or demerits of the various types of plate.

A large grill as previously suggested, in two sections.

A separate hot-cupboard fitted above the stove.

An oven with possibly slightly increased loading to shorten the time of first heating up.

The line drawing gives a general idea of a stove which would be capable of cooking a reasonably elaborate meal for from ten to twelve people.

A three-pin socket is shown and this can be used either to feed the hot-cupboard or for auxiliary apparatus such as a kettle or an iron. Another point to be borne in mind is the position of fuses. It is highly desirable that they should be easily renewable without having to disturb cooking operations. Supposing, for instance, that one fuse blew; at a pinch the meal could be proceeded with by crowding the remaining plates until the fuse was renewed. It is very inconvenient to have the fuses under the hob of the stove, as a failure during cooking operations would cause complete dislocation of the meal while repairs were being carried out.

When selecting a cooker, in addition to knowing the number of people to be catered for, the type of menu is all-important, as a stove required to meet the needs of a working-class family of four will be smaller than that required for a similar sized family where elaborate cooking is carried out.

As an example the following dinner for four people was cooked as a test. It consisted of five courses: Clear soup; sole Bercy; roast chicken, bread sauce, roast potatoes, salad; caramel cream; and haddock on toast. The complete meal, including heating up the oven, clearing the soup and its subsequent simmering, preparation of all sauces, gravy, &c., was cooked for a consumption of 3¼ kWh costing, at ¼d. per kWh, 1.75d., exclusive of the stock for the soup.

Economical cooking by electricity calls for the exercise of reasonable care, but that applies equally to all other fuels whether solid or otherwise. Provided electricity is supplied at the right price, *i.e.*, ¾d. or ½d. per kWh (and most progressive supply authorities in the country are offering such rates) then, apart from all the other advantages such as cleanliness, electricity from a purely financial point of view—which is generally the one that matters—compares very favourably with all other types of fuel.

Correct Utensils

It is most important when cooking by electricity to use the correct type of pan. Owing to the rapidity with which electric cooking with its cooler and cleaner kitchens is coming to the fore in hotels and restaurants, manufacturers of utensils are anticipating the demand by developing on the lines of the copper equipment at present in use. The new pans being made of aluminium, either cast or pressed, with heavy machined bottoms, make good contact on the flat boiling plates with consequent increase in efficiency and economy.

The importance of using correct utensils applies with even greater force to domestic installations, and great care should be taken when installing a cooker that the proper pans are supplied, otherwise cheap saucepans will be bought in ignorance. These warp badly and make only part contact with the boiling plate; whatever cooking operation may be in progress takes many times longer than it should and electric cooking gets a bad name. As a last word remember that there is no black art or magic about electric cooking; if common sense is used and instructions are carried out perfect results can be obtained every time.

To demonstrators I would say: Where possible give cooking demonstrations apart from purely cooker demonstrations. Show your consumers what can be done electrically, and electric cooking with all its attendant advantages will be even more popular than it is to-day.

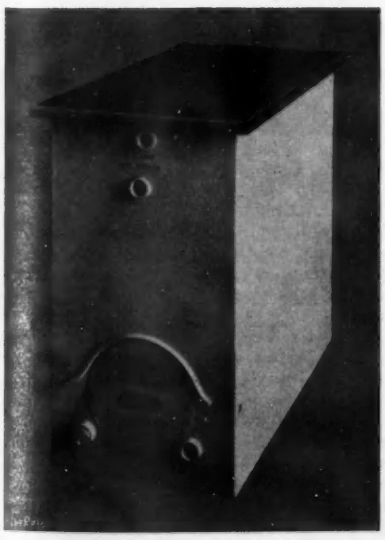
Electric Water Heaters

By Philip Honey

Hints on installation and plumbing

THE first condition to be fulfilled before attempting any installation of electric water heating is to decide the type of electric water or immersion heater which will give satisfactory results. The salesman-specialist who takes the responsibility of advising the consumer and instructing the plumber must know his job thoroughly. His responsibility will cover the choice of systems, the position and number of heaters to be used, and the alterations and additions to piping which may be necessary.

It is not within the scope of this article to discuss specifically the choice of positions, as so much depends on circumstance and the demand which has to be met at any particular tap. In any case, for multi-point supply the best place for a self-contained heater is, logically, as near as possible to the most-used tap. Pipe losses to occasionally used points, however, must not be disregarded, especially as it is within the bounds of possibility that restrictions may be enforced in the future by water authorities setting limits to the length and diameter of all supply pipes on hot-water systems.



A table-top water heater (Heatrae)

The usual method of fixing a water heater is to bolt it to battens screwed to the wall. This is often the only method possible, especially where the wall is of lath and plaster construction. A batten, nevertheless, invariably adds an extra inch or so to the overhang of the heater, making one of awkward dimensions more awkward still. If the wall is of brick, coach screws with washers make a very secure fixing direct to the wall and overcome the space difficulty to some extent. For the 12 and 15 gal. sizes, a 3 in. by ¾ in. coach screw with a No. 22 "Rawlplug" can be used, while the 20-gal. heater needs a 4½ in. by ¾ in. coach screw with a No. 26 "Rawlplug."

[Jerome

Mr. Honey is a water-heating expert on the staff of the E.D.A.

Where a large water heater cannot be fixed to the wall on account of the weight involved, the new type of square "tank" type water heater can be introduced with considerable success. This overcomes the objection to the space taken by a cylindrical heater of similar capacity and can stand on the floor, where it is useful as a table. It could also be accommodated under a sink draining board. This type, with its large capacity (30 gal. and over), need not be run at a high temperature; and its 3-kW element ensures quick recovery. Supply authorities have already found the tank type of pressure heater to be a successful rival to the multi-point gas geyser.

The Piping

Copper piping for the additional runs required for water-heating installations has found much favour of late, as with suitable fittings it obviates wiped joints and requires only a hacksaw and shifting spanner for its manipulation. Care should be taken to see that the water supply is not of a nature that will set up electrolytic action between galvanised iron tanks or cisterns and any copper pipe connected thereto. In these circumstances an all-copper installation is best, such as a cistern-type water heater (which is all tinned copper) with copper distribution pipes. Incidentally, copper piping has a lower heat loss than any other, and its smooth bore presents less friction to the passage of water.

More attention is given to-day to the flow of water from heaters than formerly, and inlets and outlets are designed with less obstruction. The great advantage of thermal-storage water heating is that there is no restriction in flow of hot water. The supply to the taps is not dependent on the rate of heating, so we ought not to lose by bad design the advantage we hold in this direction.

Adequate feed pipes and sufficient head of water are necessary to achieve this end, and it pays not to complicate the pipe runs in any way if the flow might thereby be reduced. Care should be taken to see that this does not arise where water heaters are in series with solid-fuel installations. Stop valves in the feed pipe should be of the "full way" type to prevent further resistance. An emptying-down cock fitted into the lowest end of the feed pipe is a great time saver to the maintenance man. These were regularly fitted to gas water heaters in pre-war days but only recently have they been regarded as an essential by the electrical industry.

Whilst thinking of the maintenance staff we should remember that the internal parts of the water heater, element, thermostat and so forth, will eventually need cleaning. Sufficient room should therefore be allowed immediately under the heater so that these may be removed without having to take the water heater off the wall.

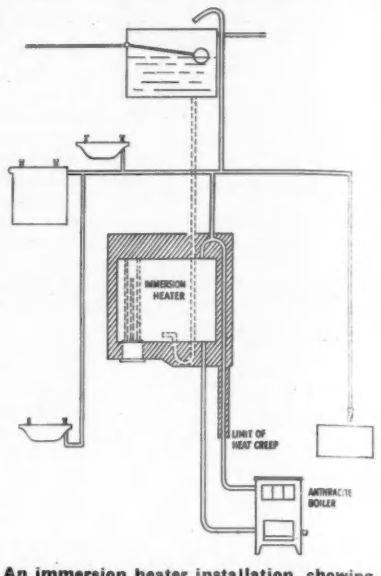
Immersion Heaters

Judging by reports from all over the country immersion-heater installations are on the increase. The introduction of hand-controlled heaters intended for intermittent use has opened up a fresh avenue in installations where lagging (and continuous heating) would be an impossibility. More care is now taken in the inspection of tanks and the run of piping before the installation of an immersion heater which results in greater satisfaction to the consumer and enhances the reputation of electric water heating.

It has always been an axiom of the hot-water engineer that where supply pipes are connected to the flow pipe of a solid-fuel hot water installation, results would be unsatisfactory when the tank was heated electrically. There is one exception, however, and that is when the flow pipe is brought up vertically outside the tank and connected to its top side by an inverted U. If the supply pipe is tapped off the top of the inverted U there is very little chance of the water in the boiler circuit being disturbed when electrically heater water is drawn. Heat will creep up the inverted U and down the flow pipe however, and for continuous heating will require lagging, but the heat will not creep further than a little way past the level of the bottom of the tank (see the accompanying figure).

Large numbers of solid-fuel fired installations are put in, even to-day, in which one or more mistakes are made which are detrimental to the introduction of electric immersion heaters. In my own house, built twelve months ago, it was discovered during the fixing of an immersion heater that the feed pipe entered the hot water tank at the bottom in an upward vertical direction. The result was that to obtain two baths in succession from a 25-gal. storage tank was virtually impossible. The fitting of a ¾-in. elbow improved the performance to an incredible extent, and two good baths following can now be obtained without trouble.

Tough-rubber and lead-covered cable seem to be the most popular forms of wiring for water heating installations. One of the undertakings that is most successful in developing the water-heating load uses three-core tough-rubber cable with a double-pole all-insulated switch. No one, it is to be hoped, uses plugs and sockets for water heaters in bath rooms. Even if they are of the three-pin type it encourages the use of hair dryers and bowl fires in these situations. The water-heater plug is likely to be forgotten and left out after use, with consequent cold water for the next user!



An immersion heater installation, showing draw-off tapped from flow pipe with successful results

The paragraphs on the earthing of electric water heaters contained in the tenth edition of the I.E.E. Regulations are considered by some to be not very clear. Where an electric water heater is installed in a bathroom and not protected by an insulated covering such as a wooden cupboard, it is evident that to follow the spirit of the Regulations festoons of earth wire must cover the bathroom to bond hot and cold pipes, waste and overflow pipes, feed pipes and flush pipes, baths and waste preventers so that no difference in pressure shall exist.

Enclose the water heater in a cupboard and one is apparently absolved from all this. Danger would still exist, however, if there was no electricity in the bathroom at all. If a faulty piece of conduit from the lighting point in the room below made connection with gas piping (not usually a good earth) under the floor, a gas geyser connected to it could conceivably become alive to earth.

It is usually considered sufficient to earth the apparatus plate on the water heater or immersion heater only, as this protects the most vital spot in the installation, and in the event of failure of insulation the heater would be the first piece of metal to become alive.

Electricity in the Garage. By G. E. Moore

Winter opportunities

ELECTRICITY has long since invaded the public garage and made itself invaluable for lighting, heating, battery charging, air-pump and petrol-pump operation, workshop drives, lifts, and neon signs. But, even in the case of many an all-electric house, the domestic garage is neglected—which is particularly unwise should there be a fixed charge that includes the garage assessment.

To some extent this is due to the fact that many garages are at a distance from the house or erected in temporary fashion. Yet the provision of one light point and of a socket-outlet for hand-lamp or engine-heater is a great boon, especially to the owner who does his own maintenance work. It is safer and certainly more convenient, after dark, to run into a lighted garage. Two-way control and the fixing of one or more exterior lighting fittings are often worth while; they are benefits that need to be brought to a consumer's notice. And if wiring is being arranged, then a small wall-mounting clock should be catered for.

It is, however, in heating that there is especial significance. There are several reasons for this: they are all connected with the well-being of the car, though even an engineer who puts his engine's comfort before his own will appreciate a warm environment for overhaul work in mid-winter.

First of all, a dry atmosphere is beneficial to the bodywork and general parts. Secondly, although in this country a "freeze-up" of the cooling system is unlikely it is by no means impossible; there are objections to anti-freezing mixtures. Thirdly, starting is facilitated and the motive mechanism is less stressed. Fourthly, by not allowing the lower limit of the engine's temperature range to fall to the low ambient temperature, wear and other harmful effects in the cylinders are reduced. These practical advantages are all important and all attractive, especially from the economic point of view.

How to heat? The most thoroughgoing method is to warm the whole garage, using any form of permanent low-temperature or black-heat apparatus; a glowing fire may be all very well upon occasion, but it is better not to advise its use in the average cramped garage. Sacrificing some of the benefits of general heating, a special heater can be fixed in the lower hose connection of the cooling system or in the bottom section of the radiator, thus circulating warm water through the engine jacket; a poorer alternative is to place a caged heater under the bonnet.

These notes are merely intended to direct attention to a part of the domestic premises where electricity should be much more utilised. The present-day motor car is utterly dependent upon electricity, and it ought to be housed where the latter can continue its good services. Both lighting and heating can be adopted in a useful and safe manner—especially as regards fire hazards. An extravagant amount of energy is not required, and there is scope for both thermostatic and time-switch control of the heating. And there is an increasing number of undertakings which offer suitable and attractive tariffs.

Electric Heating Developments

Cheerful glow from a central source, gentle warmth from a "black heat" convector, or well-distributed heat from panel or tube—all tastes are catered for by electricity. At the moment the visible element still retains public favour for individual houses; in blocks of flats there is a trend towards "low-temperature" heating. The notes which follow review activities in both directions during the past year.

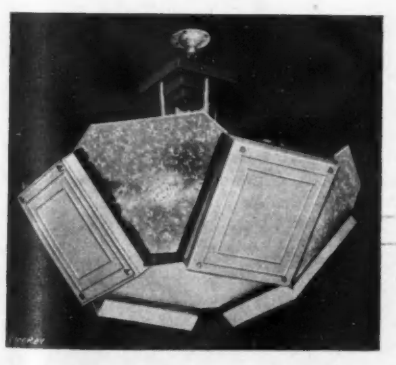
THE last thing we would recommend at the present time is any attempt to standardise space-heating equipment. Quite apart from the fact that the electrical industry has not made up its mind as to the form of electric heating that is desirable, the supply section does not yet appear to know whether it wants the full domestic heating load or not. But within the present limits the rapid development of the electric fire is satisfactory. It represents good business for the manufacturer and offers the supply authority a measure of "safe progress."

Ideas as to the operation of available equipment, however, are becoming increasingly complex, and much good, therefore, would result from some form of standardisation of terms such as has been done in connection with water-heating and other equipment. For on top of the complications which have arisen out of the shelved problems of high and low temperature operation and convection and radiation, we now have such duplications as projected and reflected and circulated and convected heat.

Bulpitt "Marlborough" sheet-metal fire

Apart from price, of course, most fires are bought for their appearance. It is difficult not to say the same thing each year about finishes—but the finishes are not the same. Some of the most recent ones are truly remarkable—and so are the means of obtaining them—from spraying through splayed rope to delicate hand painting. It is impossible for us to deal with finishes adequately, but, merely on the grounds of personal appeal, we refer to the stone effect obtained by coarse spraying on the sheet metal of the "Raystone" and other new fires of British National Electrics, Ltd.

Advance in sheet-metal working too has been responsible for much of the fire development, particularly towards price reduction. Two new fires introduced by the English Electric Co., Ltd., illustrate this point well. They are very strong and they have flat tops, being designed for plate warming. More and more too are sheet-metal fires attaining the more substantial appearance of the cast-iron fire. Bulpitt's "Marlborough," with its three horizontal reflectored elements set in an inclined plane within a pillar-type framework has something of the "stoutness" of many of the not too early cast equipments. Similarly with a heavy sheet-metal "Crescent" fire produced by Messrs. Albert Phillips, Ltd., in which a striking effect is produced by the avoidance of symmetry. The end pillars are of different heights and disposition.

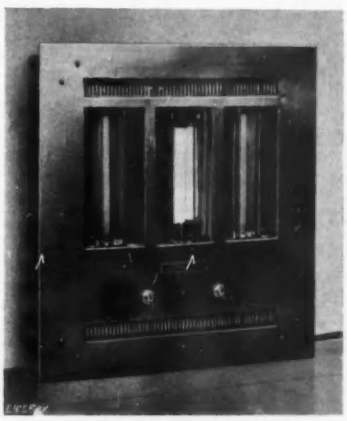


Revo combined heating and lighting fitting

But the day of the cast-iron fire is by no means over, and that "massiveness" of frame possessed by the Belling "Adam" and French and Son's "Temple" and very many others is still the pride of the foundryman. It seems, however, that the casting, at any rate the heavier type, belongs generally to non-reflector equipment. But in the Premier "Maxwell" and "Bredon" reflector fires there is the heavier cast construction usually associated with bar element radiators.

Mr. Ray Berry told us recently that there is an increasing demand from the public for larger fires irrespective of loadings. In view of the tremendous growth recently of electric fire business, particularly that outside the normal electrical manufacturing section of the industry, a point stressed by the General Electric Co., Ltd., is well worth recording. In the design of its new cast-iron portable fires special attention has been paid to the height and angle of the elements in relation to the floor, so as to prevent overheating of floor coverings.

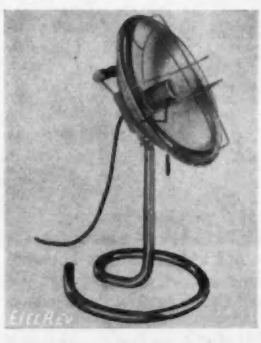
We think that with a consolidation of ideas on electric space heating the combined heating and lighting fitting scheme is likely to be extended. But if it is in the heating engineer's province to install heaters in conjunction with lighting, why cannot the many lighting (psychological) effects striven for in connection with normal fires be regarded as lighting (effect) problems? A clearing up of that point would help so much in advancing electric heating.



Hanovia heater and sun lamp combination

The "Unity Sunglow," the latest development in this field by Unity Heating, Ltd., has a special silica bowl which glows red from an element which fits closely inside the bowl. A combined lighting and heating fitting was introduced this year by the Revo Electric Co., Ltd., and more recently our attention has been drawn to a similar unit produced by the Space Heating Co., Ltd.

Heat treatment of the body is beginning to be spoken of—if only in a whisper. A sounder idea was never exposed in connection with domestic electricity supply. Industrial electric heating could not possibly have made a small fraction of the advance that it has made if a serious scientific study of heat treatment had not been undertaken. We do not refer to medical treatment. Health treatment is increasingly being considered apart from medical treatment nowadays. And how narrow is the margin (if any) between the provision of warmth for the body and a necessity (heat) for maintaining health. We therefore think the combined fire and sunlamp introduced by Hanovia, Ltd., a very good development and one that should be lifted out of the field of "novelties."



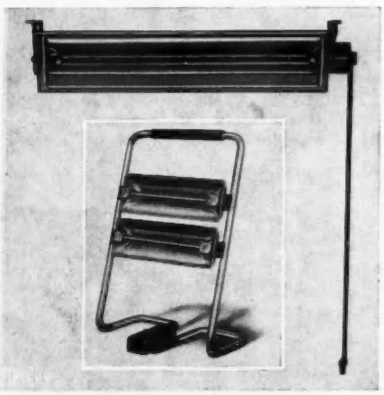
"Cobra" bowl fire (Hotpoint)

Many claims have been made

on the score of health benefits for "Sunray Tricity" radiators (Messrs. L. G. Hawkins & Co., Ltd.) by virtue of their reflectored and louvred lamps. These lamps are now 200-W tungsten-filament units and they certainly result in a very pleasant effect of warmth. The latest models are much smaller and the louvres are closer together.

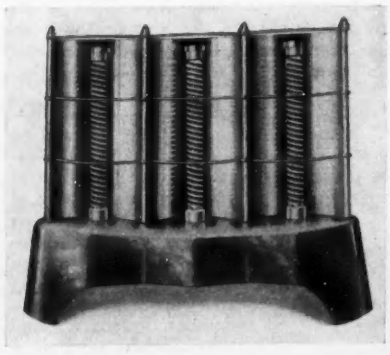
The "Lounge" of Carron Company and the "Floodlit" of Siemens Electric Lamps & Supplies, Ltd., are certainly two good examples of the "floodlighting" fire which has made considerable appeal within certain limits. A more recent move still is the illuminated picture. The "Skye" produced by Hotpoint Electrical Appliance Co., Ltd., and the "Sunset" introduced by Messrs. Belling & Co., Ltd., each have an ornamentally designed glass panel illuminated from behind. These are both reflector fires and the hammered reflector of the "Sunset" is also illumined by the lamp. To show a glowing image of the element unit when it is off circuit in the reflector is an idea adopted by the Manor Electric Oven & Fire Co., Ltd.

The older and well established imitation fuel fire has been advanced recently by several improvements in the "coal." Glass-silk is one of the new constructional materials, and British National Electrics, Ltd., have been foremost in the development of this material, coupled with "a new and ingenious flicker and smoke movement giving exceptional realism." Concerning a similar development of their own in the "Coal Effect" fire, the English Electric Co. says that the fire "leaps into life with wonderfully realistic effect immediately the switch is depressed." Messrs. W. T. French & Son refer to a translucent synthetic material as giving a very pleasant and realistic effect in connection with their new "coal" fires, and recently we saw some very attractive "coal" being moulded in bakelite for the "New Cherry" Belling equipment. In a new Hawkins fire a very realistic smoke and flame effect is produced on a wire gauze background.



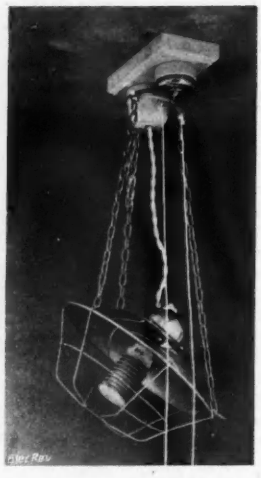
Long adjustable bath room heater and tubular fire (Inventum)

One idea behind the design of the "Glenberry" and "Villaberry" recently introduced by Berry's Electric, Ltd., is a larger coal effect, while a further move in connection with the "Villaberry" is a system by which "flames" disappear behind the element bars by virtue of the inward V-shape of the fire body. Recessed chimney effect is also a feature of the new B.N.E. "Woodstock," in which there is the "appearance of flying particles of red-hot soot and of rising smoke." Berry's told us, by the way, that while business in "period" fires is falling off, the log fire is still a best seller because of the brick fire surround which is employed in the not too small new house of to-day. In the imitation-fuel fires recently introduced by Messrs. Albert Phillips, Ltd., the "Crescentglow" imitation coal is switched on separately.



Jackson frameless reflector fire

The Belling "Utility" has two 1-kW bars, one above and one below the fuel, and the top one can be turned into the horizontal plane for kettle boiling. A new note in imitation-fuel equipment is the "coal" and the element surfaces in the same curved plane, as in the fire recently introduced by Messrs. H. W. Sullivan, Ltd.

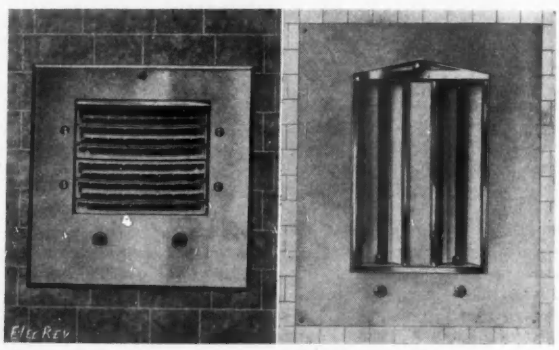


Reyrolle "Reydome" ceiling bowl fire

While it is only 10¼ in. high overall, the "New Ascot" produced by the Simplex Electric Co., Ltd., is loaded at 2 kW. It has one reflector under the "coal" serving two rod-type elements. Quite a number of imitation-fuel fires now have reflectored elements. The "Sungleam" of Messrs. Falk, Stadelmann can be supplied as either a reflector or a non-reflector equipment. Siemens's "Cosyglo" has two rod elements set in a sweeping back reflector in a frame and above the "coal." The "Glenberry" is also of the reflector type. We congratulate Messrs. Ferranti, Ltd., on their efforts to combine their parabolic reflector with a coal unit. It would be a pity to see the principle of scientifically designed heating equipment rendered subservient to effect.

In connection with their new non-reflector "Dragon," Hotpoint refer to diffused heating, presumably in contrast to directional heating for which some reflector fires are designed —particularly bowl fires. But many reflector fires are designed for flooding comparatively large areas in accordance with the scheme initiated by the late Dr. Ferranti, and it is in this respect that we feel that the indiscriminate use of such terms as reflection, projection, diffusion and flooding is likely to lead to much confusion among consumers.

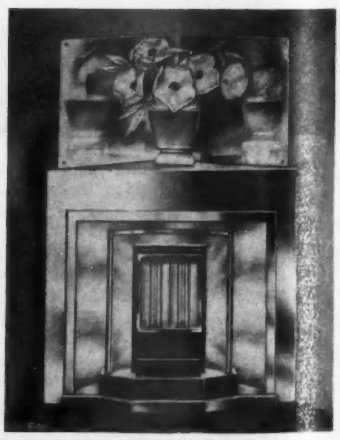
Wide distribution of heat seems to convey a definite meaning for any type of equipment, and there are several moves to obtain this, particularly among reflector fires. The "Projector" fire produced by the Arora Co. has a reflector in two parts set at slightly different angles. In a similar way heat from the top element of the Belling "Twin-Focus" is reflected slightly upward at an angle of about 30 deg. to warm the upper part of the body, while the lower unit serves for the feet and legs.



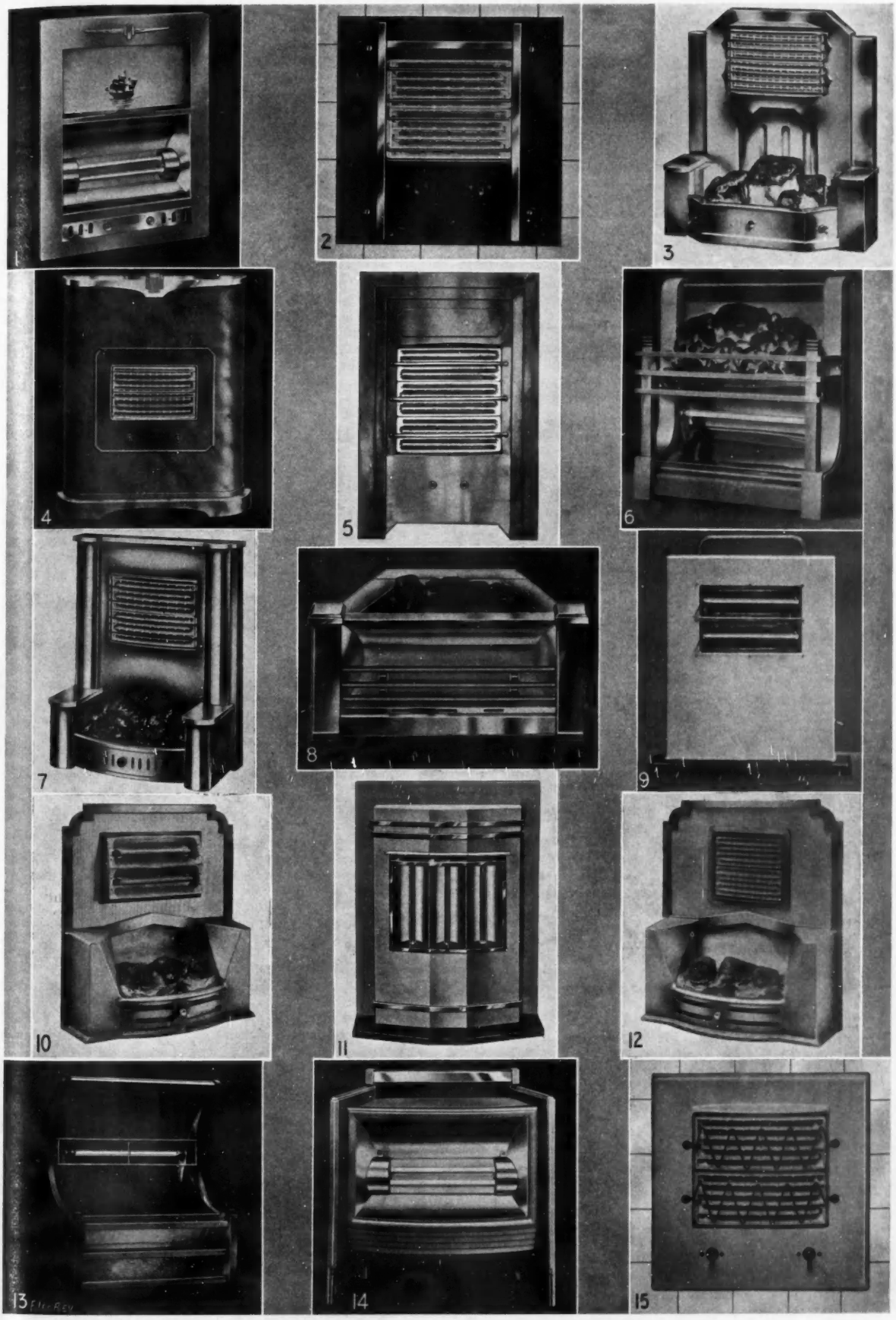
Siemens panel fires

Exceptionally wide distribution is afforded by the "Paragon" imitation-coal fire produced by Messrs. Berkeley & Young, Ltd., by means of the two "dual-parabolic" vertical reflector units at the corners in addition to the horizontal element recessed in the frame above the coal. The "Utility Hot Bar" fire produced by the Dowsing Co. has the metal surround slightly curved at the bottom to project heat well out into the room. The elements are slightly convex.

Outward setting of the outside reflectors in vertical separately reflectored element fires, such as is done with the new screen fires of the General Electric Co., Ltd., is another means of affording wider distribution. These fires have their switches near the top of the frame—a good idea for accessibility. In the case of non-reflector fires the fireclay formers are sometimes



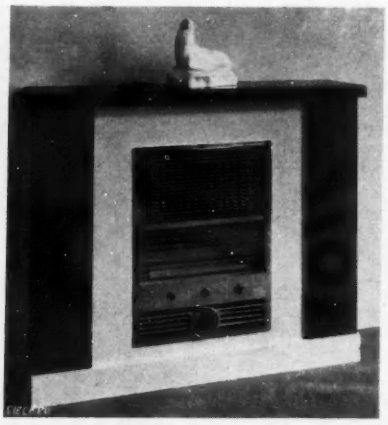
"Haloberry" with fan for hot-air circulation



Modernity is the Keynote of these Representative Electric Fires

1. Hotpoint "Skye" with illuminated picture. 2. Electroway inset fire. 3. English Electric "Coal Effect" equipment. 4. Simplex "Dorset" with all-metal surround. 5. Mantel fire by Eastwoods. 6. Ferranti principle maintained with imitation fuel. 7. A synthetic material coal effect. (French). 8. New Ascot 2-kW fire only 10 in. high ("Creda"). 9. Coarse-sprayed "Raystone" (B.N.E.). 10 and 12. Two forms of the Falk, Stadelmann "Sungleam." 11. "Magnet" screen fire. 13. "Glowera" with bottom glow device. 14. "Framed" parabolic reflector (Hotpoint "Puma"). 15. Falkirk wall fire

shaped to get similar results. "Exceptional heat distributing powers" are claimed for the "double radius" firebar as used in the new "Trent" and "Knowle" fires introduced by Premier Electric Heaters, Ltd.



A wood cab net "Thermovent" convector

In principle, ideas to effect directional heating are similar to those adopted for wide distribution, except that the angle setting is usually variable for directional purposes and is almost solely confined to reflector equipment. The Carron "Beacon" and the cradled reflector fires by Phillips have their reflectors pivoted in the supporting frame for focusing, while the beam direction of the recently introduced 600-W Premier "Paraglow" is varied by adjustment of the rear legs of the fires. These three makes of fires are all of the endless-reflector type which has developed rapidly in a matter of practically months only. The new English Electric parabolic reflector fire is similar, but without swivelling, and so is the "Wizard III" by Falk, Stadelmann, which is also pivoted and built in a tubular stand.

The "Queen" reflector fire produced by Messrs. H. G. Moseley & Co., Ltd., is notable for its unusually large horizontal reflector suspended in a tubular frame. The tall easel-like construction gives the tubular fire of Inventum, Ltd., a distinctive note, but probably the outstanding constructional point about this is the switch and connecting box at the base in which the ends of the tube terminate. An outstanding exception to the endless parabolic reflector construction is the Hotpoint "Puma," which has reflecting endplates, while the whole is set in a substantial cast-iron frame.

The new G.E.C. reflector fire is also of tubular frame construction, and this company states that its last season's reflector fires secured great popularity. It seems that the affection for the rod-type element among manufacturers has as much to do with this development as has the reflector fire's appeal to the consumer. To prevent a fractured rod touching the reflector or guard, insulated metal loops encircle the elements on "Magnet" reflector fires.

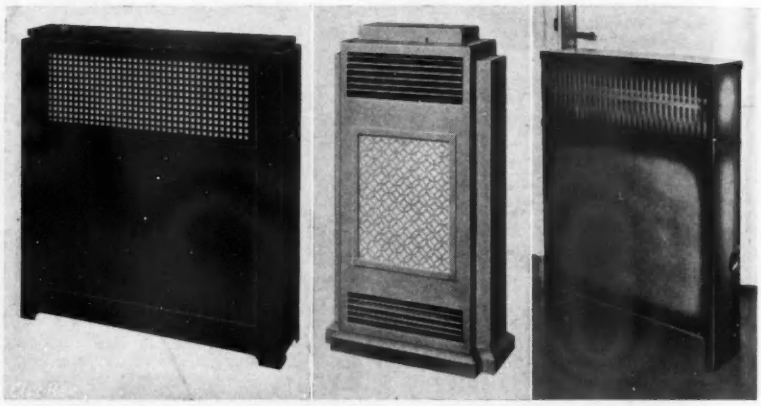
"Genii" hot-water radiator with insulated convector shield (Geo. Nobbs)

The Hotpoint "Cobra"—a bowl fire on a tubular pedestal-type stand—is considered to be the logical development of the standard bowl fire. The "Reydome" ceiling bowl fire produced by Messrs. A. Reyrolle & Co., Ltd., is one of the simplest methods of overcoming the peculiar bathroom heating problem. It can be focused easily for any angle of projection and switching is effected by a pull cord. An Inventum fire for bathroom use is similarly operated. Because of its particularly long single reflector (3 ft. overall) and its 1,700-W loading we regard it as an important contribution to bathroom heating.

The six hundred watts or so loading is now by no means confined to the bowl fire. For instance, the Simplex horizontal-trough "Plover" is loaded at only 600 W, and this and 750 W apply to two new fires introduced by the Grafton Heater Co. The smaller unit has a bar element in a well at the foot of a sweeping back reflector. We have seen a few bakelite-frame fires recently; the latest development appears to be a small horizontal reflector fire listed by the Cooper Stewart Engineering Co., Ltd., which has coloured bakelite sides. The Jackson Electric Stove Co., Ltd., reports that it has introduced nothing new owing to the popularity of its last year's models, and it directs our attention particularly to the vertical element reflector fires with separately reflectored elements and without the usual outer framework—a distinctive feature of this make for some years.

We feel that there might be some confusion regarding the new "Magnet" screen fires which stand solid on the floor, are designed to conceal the majority of grate openings, and are loaded at 2 kW, for the term "screen fire" usually implies the ornamental fire screen fitted with a small fire or element unit, such as the new Grafton screen fire with its back-supporting bracket and 600-W 10-in. bowl fire. The term might also be applied to many surround, panel and mantel fires and such fires as the Simplex "Dorset" which is designed for permanent floor mounting but has something of the screen effect about it.

Mantel, panel, surround, inset—each of these terms could and should be applied to a definite type of fire, but how often does one see all the terms used in connection with one class of equipment only? The width of the frame and the fire seems to determine the classification in a good many cases. For example, the "Xcel H7368" has a wide frame which can be regarded as its own surround or otherwise, but the pressed-steel frame of the "H7369" model of the same make is essentially the fire surround. The sheet-metal inset fire produced by Electroway Heaters, Ltd., is definitely designed for use without a surround, other than the wide frame of the fire.

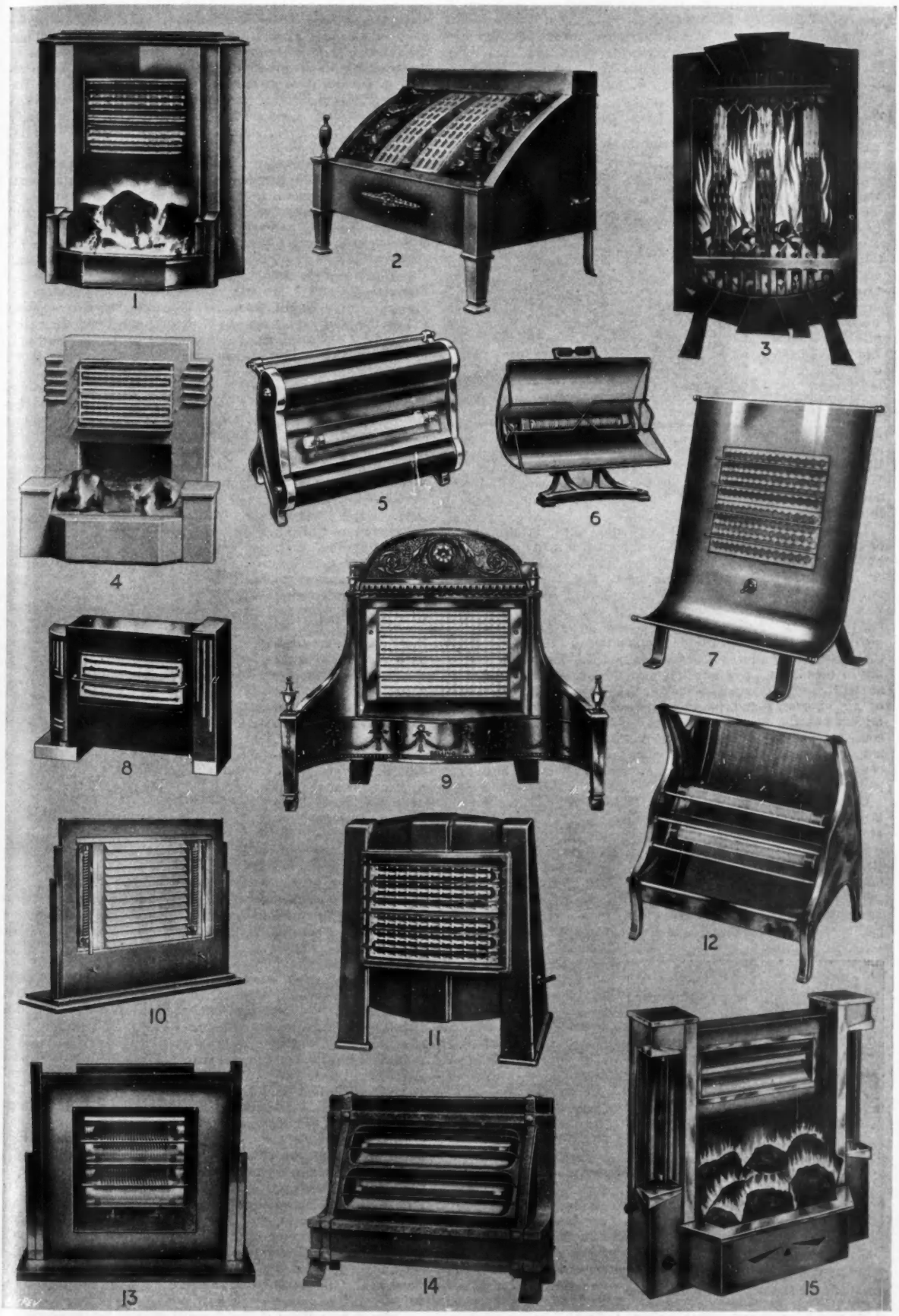


Heatrae air warmer, Artic "Airflow" convector, and "Thermidair" convector

That something we call "character" is responsible for the ready acceptance of the "Colonel" inset fire made by Messrs. H. G. Moseley & Co., Ltd., as a surround unit (it should be good as shown with the glass surround) or as a straightforward panel equipment. The "Major" radiator is the same unit with the necessary appurtenances to render it portable. The English Electric combination mantel surround and fire has a useful and attractive shelf at the top of the surround. Some outstanding examples of mantel fires, with and without shelves and distinctive tall and slender looking backs, are produced by the Falkirk Iron Co., Ltd. A new wall fire made by this company is suitable for mounting in tile surrounds and has a box frame for grouting in, to which the fire portion is readily screwed.

Six-section (750-W) Warmo hot-water radiator

It is becoming a habit to refer to the popularity of the inset fire in such periodic reviews of heating equipment as this. But the development is truly remarkable and certainly the outstanding one commercially. The separate Carron inset-fire list is one indication of this. This company has revived the old question of convection from the radiator-type fire by virtue of heat circulated round the back of the elements. Similarly, portable mantel fires introduced by Messrs. Eastwoods, Ltd., are fitted with a canopy baffle which induces a hot-air draught at the back of the fire bars, and the back element casing is lined with asbestos. This arrange-



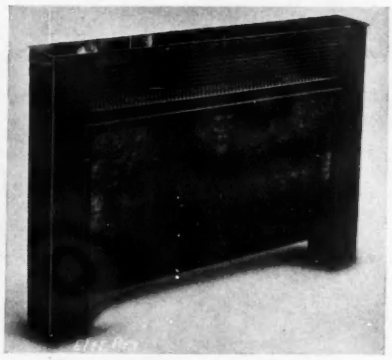
Further Examples of Good Modern Fires

1. "Villaberry" with chimney effect. 2. Sullivan coal fire. 3. Artic "coal flame" radiator-convector. 4. "Woodstock" (B.N.E.) chimney effect fire. 5. Grafton reflector fire (750 W). 6. Carron "Beacon" with adjustable reflector. 7. "Dowsing" "Utility Hot Bar." 8. "Crescent" (Phillips) sheet-metal fire. 9. Belling "Adam." 10. An improved "Sunray Tricity" (L. G. Hawkins), one of the new smaller models with the louvres closer together. 11. "Magnet" c.i. portable fire. 12. Arora projector fire. 13. Reflector fire (Manor Electric Oven & Fire Co.) in which element is mirrored in the reflector. 14. Premier "Bredon" reflector fire in cast frame. 15. The Berkeley & Young "Paragon"

ment is claimed to give the maximum of radiation and convection.

Whatever the extent, the heat dissipated into the cooling air is certainly circulated into the room. For the first time we have seen a figure given for the wall temperature at the back of inset fires—well below 100 deg. C., says the G.E.C.

The idea introduced a few years ago of fitting baffles over the element units of inset fires to deflect the heat outwards and prevent or reduce discoloration of the equipment and walls has now been extended to portable fires. For example, the "Cromwell" and "Dorchester" reflector fires marketed by Messrs. Bulpitt & Sons, Ltd., have baffles over each of two staggered horizontal reflectors. The small unit designed for permanent installation in a coal fire mantelpiece, such as the Electroway unit, must also be regarded as inset equipment. We prefer the all-electric job, of course, but, as with all ordinary electric fires installed, we hope that they are the "means to an end."



Benham panel air heater

The combined radiation and convection idea, in principle or as a system, is just as strongly supported in many quarters, but there is little effort made to push the sale of equipment or, indeed, electricity along those lines. Nor, we should say, is there likely to be with the present limited conceptions of load building. The combined radiators and convectors bearing the names "Artic Glow," "Flame," and "Coal Flame" produced by the Artic Fuse & Manufacturing Co., Ltd., with their three, four and five "effects in one" appear to be gaining in popularity. We are told that they circulate warm air at 200 ft. per min., and we suggest that to know the quantity of air circulated and its temperature would help many to understand the meaning of this. We believe that in the confusion of ideas and terms relating to air convection and circulation there is a serious risk of a setback to convection heating, with consequent damage to electric heating generally.

Berry's assure us that with the "Haloberry" effective room heating results from the fan drawing air from the outside atmosphere and passing it into the room after it has been warmed during its passage round the back of the radiator elements. If this is so then a really big advance has been made in electric space heating.

There is a marked tendency to increase the loadings of convectors nowadays, and this gives rise to further confusion regarding the terms high- and low-temperature heating.

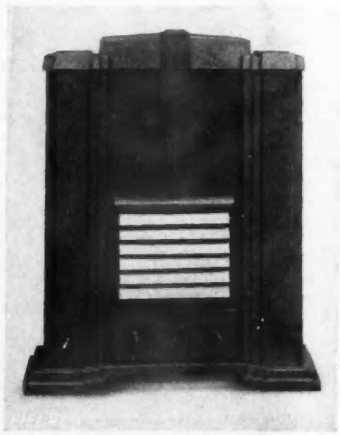
"Walline" recessed floor panel heater (Space Heating Co.)

Heatrae, Ltd., have three convectors with one-, two- and three-kW loadings, respectively. The largest model measures overall 32 in. high, 41 in. wide, and 7 in. projection, and the makers tell us that the discharge-air temperature can be taken as about 100 deg. F.

Thermovent, Ltd., say that their convectors operate with a discharge-air temperature of 200 deg. F. The loadings of three cabinet "Thermovents" are one, two and three kW respectively, and the overall dimensions of the largest model are 25 in. high, 42 in. wide and 5½ in. projection. An interesting test report signed by Dr. George Green, of Glasgow University, shows that for two rooms similar in all respects one heated by "Thermovents" and one by radiators of practically the same total loading, the electricity consumption was roughly twice as much for radiation as for convection for a two-hour run with automatic temperature control in both cases. The Arora air heater is loaded at either 1½ or ¾ kW, and the dimensions are 30 in., 22½ in. and 5¾ in. The Belling convector is one example of the tendency to illuminate convectors. A concealed lamp results in a warm glow at the base and also indicates when the convector is switched on. Incorporating a thermostatic switch in the convector equipment is an idea advanced by Unity Heating, Ltd. "Thermidair" convectors produced by Midland Metal Diecastings, Ltd., are available in lengths (side to side) of from 20 in. (1 kW) to 38 in. (3 kW). The elements are loaded at 350 W per foot and the outlet temperature does not exceed 120 deg. F.

In providing cabinet enclosures for their "Electrovex" and "Electro-vapour" hot-water type radiators Messrs. Benham & Sons, Ltd., seem to have further answered the often repeated question: Are these appliances radiators or convectors? The appearance is certainly improved. The convector shield fitted to "Genii" low-temperature hot-water radiators by Messrs. George Nobbs, Ltd., is claimed to prevent radiation loss to the wall, or blackening of decorations above the radiator, and by deflecting the heat outwards to give a more uniform heat distribution. The most interesting point about these, we think, is that the shield itself is heat insulated. The Benham enclosure also reduces or prevents wall blackening, of course. Hospital-type hot-water radiators produced by Eastwoods are of "special solid heavy" construction and are said to possess high thermal storage capacity.

A departure from the usual "permanent installation" idea associated with hot-water radiators is the portability of the units produced by the Warmo Heating Co. They are provided with castors. The largest listed "Warmo" equipment has fifteen sections and 38 sq. ft. of heating surface, and it is loaded at 2.5 kW. It is interesting to compare these loadings and that of 60 W per sq. ft. given by Messrs. George Green & Co. with the usual 60 W per foot run of standard 2-in. heating tubes. It is not often, however, that surface temperature figures are given, and we suggest that they are useful to contractors and others. For their 60-W, 66-W and 90-W tubes (2 in., 1¼ in. and 1¼ in.) Arora give 210, 250 and 350 deg. F., respectively.



Raytonic radiator

An example of the very much increased loading of tubes permitted by increasing the emission area by gills is to be found in the Heatrae gilled air warmers. A 2½-ft. length (single) is loaded at 500 W.

Portable tube radiators such as those sold by Siemens are excellent for many purposes and places—window and door recesses in particular. The Waring Tube Heating Co., Ltd., advocates tubes recessed below the floor level. This idea is extended in two ways by the Space Heating Co., Ltd., which says that its "Walline" recessed skirting panel is virtually a miniature low-temperature panel which may be installed round the full perimeter of the room. The "Walline" floor panel is installed flush with the floor in such places as in front of French windows. The surface must be exposed and the loading is 30/40 W per foot per 5-in. width.

This company's low-temperature and high-temperature panels represent the clearest attempt that we have seen at discrimination between the two systems of heating. The low-temperature panels are supplied in sizes up to 8 ft. 6 in. by 2 ft. 6 in. and loaded to 1.5 kW, while the high-temperature type are available in sizes up to 25 ft. by 15 ft. and loaded to 1.25 kW. A rather similar idea is expressed in Benham's open and flood "Panelrays." Open heaters loaded at 1,250 W measure 1 ft. 4 in. by 5 ft. 4 in. and 2 ft. by 4 ft. and a flood heater of the same loading is 1 ft. 4 in. and 2 ft. 8 in. in size.

There is something of the thermal storage heater about the radiator produced by Raytonic Heating & Engineering Co., Ltd. It has a concealed 625-W vertical element at each side and a 250-W carbon lamp provides a pleasant visual effect through translucent louvres.

The domestic scene at the head of this article was "staged" for our photographer by the Kensington & Knightsbridge Electric Lighting Co., Ltd.

New Ideas in Cooking Equipment

Since our last Domestic Number appeared we have witnessed a period of exceptional activity in the popularising of electric cooking. At Poplar early this year over 10,000 attended a series of demonstrations, as a result of which hundreds of additional cookers were installed. Similar reports have come from many other parts of the country. In the following article we describe some of the ways in which the manufacturer is playing his part in furthering this development.

AUTOMATIC oven temperature control is probably engaging the cooker manufacturer's attention as much as anything to-day, but so far as marketed equipment is concerned such control at present represents only a minor development. We are not sure yet whether or not the time is ripe for sounding the industry generally for its feeling on this point, but we are confident that, with automatic control or not, there will be some fairly widespread changes in cooker construction sooner or later arising out of the possibility of applying the thermostat to cooker work.

During the deliberations in the past few years on radiant and convected heat in connection with space-heating we have not thought that one day something similar might take place in respect of cooking developments. Yet recently we saw some results of experiments by Messrs. Belling & Co., Ltd., which showed that for precisely the same air temperature and load conditions, but with different element control arrangements, bread scorching took place in one case only due to excessive radiant heating. In a cooking equipment article it is too early to dwell on the different methods of effecting automatic control, but as Belling are trying out both single- and two-stage control it is well worth recording that they seem to favour the single-stage scheme.

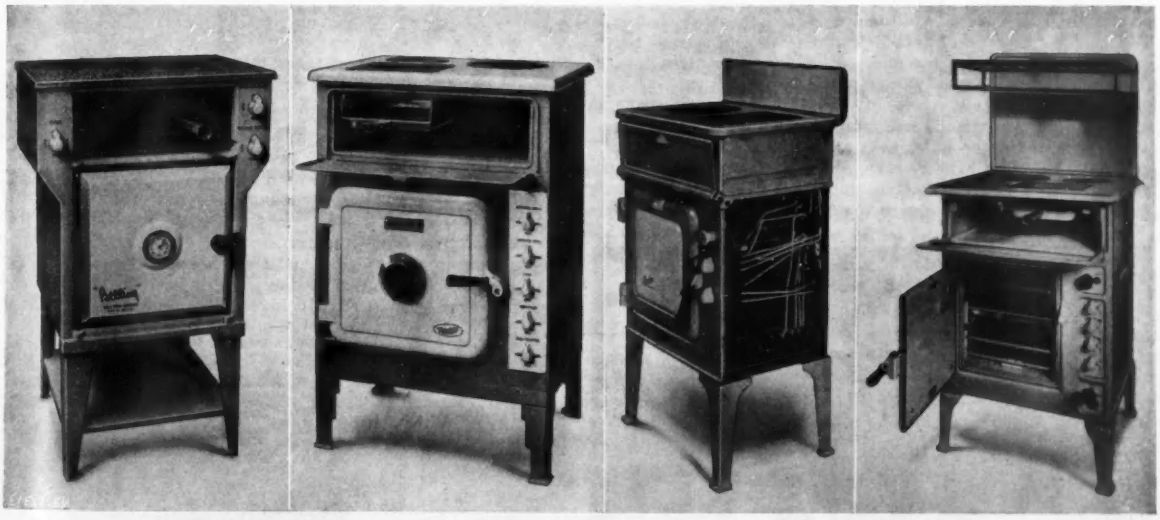
While practically all manufacturers have made it clear that they can answer demands for automatic control, only a few are definitely advocating it. Messrs. Albert Phillips, Ltd., newcomers in the cooking field, have started right away with automatic control as standard. Messrs. Moffats, Ltd., are keen on the idea, and say that the extra cost is partly offset by the elimination of the usual oven switch. Tricity Cookers, Ltd., have pointed out that heat sectionalising for different kinds of cooking is permitted by the combination of three-heat switching and automatic control. Messrs. Siemens Electric Lamps & Supplies, Ltd., appear to be rather more impressed by the finer temperature regulation afforded by automatic control.

Because "steam ejection" was initiated definitely in conjunction with automatic control (by Igranic Electric Co., Ltd.), a brief reference here is fitting. We have seen the system applied to a good many Belling cookers, but they are inclined to look on the scheme just as one form of ventilation, as also does the Revo Electric Co., Ltd. We have seen a Phillips' "De Luxe" cooker fitted for "steam ejection" as an experimental measure.

Finer heat regulation, however, is not necessarily linked with automatic control, and we are reminded of past, and in a few cases, present, top and bottom heating with separate three-heat switching, and the many more loading degrees obtainable thereby. There is also the infinite heat regulation offered by Kubex, Ltd., in connection with their small oven for table-top work which they claim is the only oven on the market that provides such regulation, excluding automatically controlled equipment. It is to obtain greater oven-heating flexibility that Messrs. Falk, Stadelmann & Co., Ltd., have adopted low-heat switching at one-sixth of full load, and the aim at flexibility is behind the recent thermal-storage cooker developments of the General Electric Co., Ltd. In the semi-storage cooker, with its 160-lb. block entirely heat-insulated from the oven, it is claimed that for a total load of 2 kW the facilities of an ordinary cooker loaded at 8 or 9 kW are provided. In the "all-storage" cooker an additional 60-lb. block serves for grilling and also assists the oven heating. This block is partially heat-insulated from the top block to prevent the temperature of the lower one, from which the upper obtains its heat, being appreciably affected by heavy withdrawals of heat from the top block.

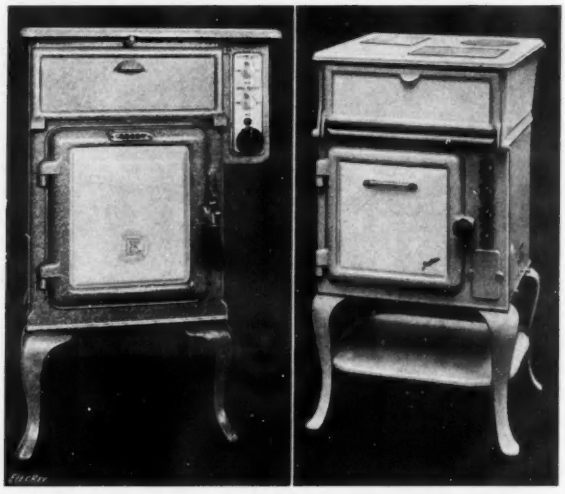
Better Hot-plate Control

One hears more about flexibility in connection with the boiling-plate, and we are with the G.E.C. in hoping that the adoption of four-heat hot-plate control will do much to dispose of the unjust criticism levelled at the efficiency of electric cookers. The "Radiant" self-contained griller-boiler unit produced by British National Electrics, Ltd., has its sheathed element coils arranged in two separate sections with 4-heat control, the central section being controlled by a single-heat switch and the outer section by a two-heat switch. With such switching the control does not appear to be limited to four heats. The "Radiant" tubular sheathed coil element is made as a hot-plate for fitting to practically any make of cooker and, as with the "Torribar" hot-plate of similar construction fitted to the cookers supplied by the Hotpoint Electric Appliance Co., Ltd., the two sections have overall three-heat control, with the inner small section alone on medium heat to afford, in effect, a separate small hot-plate.



Left to right: A Belling light-construction cooker; a Tricity model with automatic control and three-heat regulation; a Simplex design with "exterior" elements and automatic control; and a Siemens "Automatic" cooker with main switch

While from one angle this " plate within a plate " idea gives a measure of flexibility, so, from a different viewpoint, does the " interlacing " of elements on the Phillips boiler-griller to distribute heat over the whole area of the plate on all switchings. In each case, we suggest, the size of the utensil used governs the issue. We have learnt of the " Tricity " low-voltage griller-boiler with ten heating steps within loading

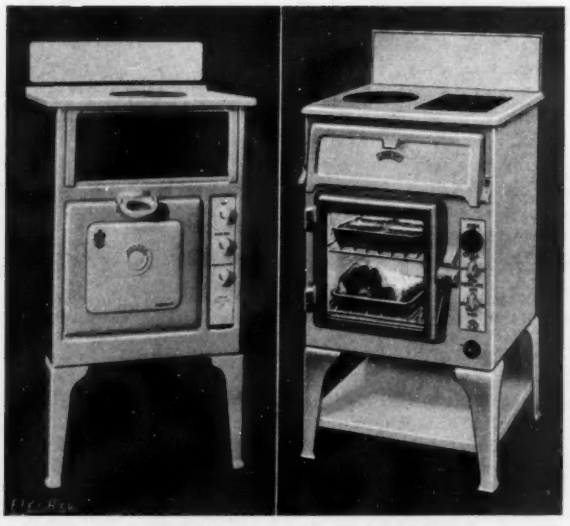


An English Electric cooker fitted for automatic control, and one of the Jackson range with back extended hob

limits of 800 W and 2,250 W, and also of an experimental move by Falk, Stadelmann to afford infinitely variable control on a l.v. boiling-plate by varying the air gap in the core of the transformer.

Associated with the last-mentioned development is the same company's quick-boiling scheme. A 2,500-W l.v. boiling-plate operates at 6 V, while by virtue of the two-plate construction of the element coils the upper layer permits only a 3-V drop between it and the utensil, assuming the utensil to be at earth potential. The transformer plates produced by Revo Electric Co., Ltd., and Simplex Electric, Ltd., are, of course, designed to the same end, while another quick-boiling idea advanced by the last-mentioned company is a boiler-griller constructed of element bars covered with stainless-steel inverted channels. The English Electric Co., Ltd., claims that the special tough cast-iron which it uses for solid plates permits a lighter casting and, therefore, quicker heating.

Generally speaking and, of course, individual makers' schemes and loadings apart, it is the lighter casing or enclosure on which the quick-heating claims for " visible-heat " elements are based. (We are not discussing thermal efficiency.) Hotpoint stress the combination of radiation and conduction as an advantage of the " Torribar." Judging from



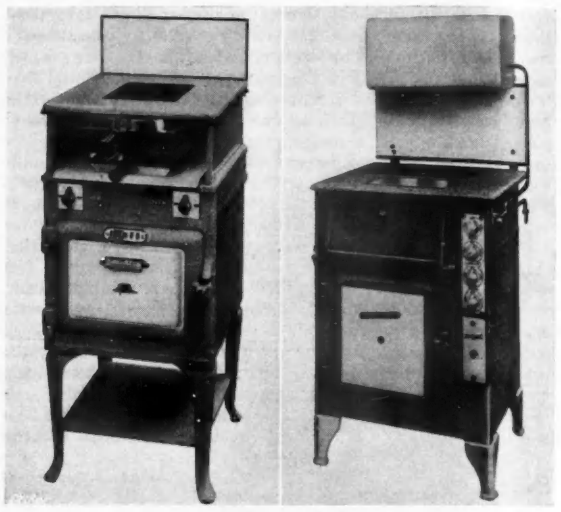
The Moffat 42 M model, and a Phillips cooker with automatic control and a glass door

the number of " Chromalox " (Messrs. George Bray & Co., Ltd.) and other light-casing plates one sees on many makes of cookers nowadays (usually optional) the " visible heat " equipment certainly does appear to be gaining ground. We do not believe that this is because of dissatisfaction with the working of the solid plate, but rather on account of the " psychological effect " appeal to the new consumer and/or the supply engineer, and also on account of easier groundwork for the salesman and demonstrator in that residual-heat teaching is not so important. We have no fault to find with easier salesmanship, providing it is compatible with good, indeed better, service in every way. Moffat's " Cookquik " semi-radiant plates have been increased in loading.

Reducing Oven Width

Results of the past few months' intensified efforts to secure overall width reduction of small complete cookers (not table-top units and the like) are extraordinary. From a few examples taken at random and on a straight external width for oven volume basis, we should say that Revo takes first place with a width of 11¼ in., B.N.E. being a good second with a width of 16¼ in. and a volume of 1,940 cu. in. The Revo cooker has a 2,000-W boiler, a separate grill and 1,500-W oven load, while the B.N.E. equipment has a 1,800-W boiler-griller and a 1,500-W oven load. An English Electric cooker with an 8-in. boiling plate, 1,600-W oven load and 1,283 cu. in. oven volume, is 15-in. wide.

At 16½in. wide and with an oven volume of 1,100 cu. in.,



B.N.E. C5 equipment and the " Hotpoint " combined cooker and water heater

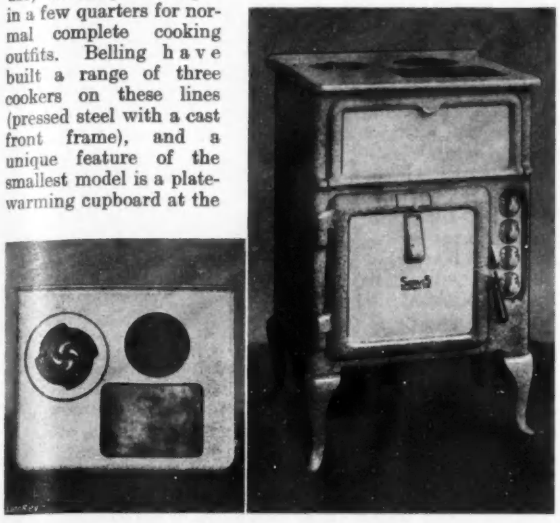
Carron Company offers a 2,000-W boiler-griller and 1,250-W oven load, while the smallest Falk, Stadelmann outfit is 19½ in. wide, has 1,620 cu. in. of oven space served by 1,000-W separately, and is equipped with a 2,000-W boiler-griller. Comparison is a little difficult because it is not clear in all cases whether the cooking spaces given are net or gross; this is a point that wants clearing up.

Building-in the switches and fuses between the hob and the hot-cupboard as adopted by the Falkirk Iron Co., Ltd., is one constructional means of reducing width, and another is extending the hob backwards as has been done in the 93J by the Jackson Electric Stove Co., Ltd., as a means of accommodating an extra boiling-plate. This cooker is similar to the 92J, except for the extra circular boiling-plate, which differs in design from the popular 91J, mainly on account of an increase of 2 in. in the height of the oven interior.

A Met-Vick boiling plate with the element hinged to the under-carriage

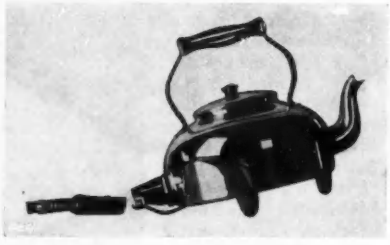
Space saving is not always a question of width reduction, however, and often width is subordinated to actual floor space saving. The new Hotpoint table-type cookers, for instance, were originally developed for use with refrigerators in kitchenettes. With a refrigerator a complete outfit measures 40 in. wide, 19 in. deep and 38 in. high to the hob. The refrigerator capacity is 2.8 cu. ft.

The boiling-plate and grill unit and the oven produced by the Arora Co. on suitable stands make either vertical or horizontal cooking outfits. A complete horizontal equipment measures overall 3 ft. wide, 18 in. deep and 3 ft. 9 in. high. The Arora equipment is an example of the lighter construction, similar to that often associated with units for table-top use, recently developed in a few quarters for normal complete cooking outfits. Belling have built a range of three cookers on these lines (pressed steel with a cast front frame), and a unique feature of the smallest model is a plate-warming cupboard at the side of the oven. Considerably reduced lagging is another point, and the development is closely associated with reduced overall dimensions. The cooker is 19½ in. wide overall and has an oven space of 1,452 cu. in., which, considering the side warming cupboard, is fairly large. It has a 2,000-W boiler-griller and 500 W of supplementary heating in the oven. The latest "Nippy" by Messrs. Berkeley & Young, Ltd., is loaded at 2,300 W, including 1,800 W for the boiler-griller, has an oven capacity of 1,255 cu. in., and is 18½ in. wide.



A Falk, Stadelmann cooker with a 2,500-W boiling plate operating at 6 V

We consider that the designation "our single-plate cookers" adopted by Moffats immediately gives an idea of size, and standardisation of terms is certainly needed. Standardisation of construction, however, is a long way from recovery from its set-back of a few years ago. The G.E.C. claims that in the four existing cookers on which it is concentrating its main production it has the nearest approach so far practised by one manufacturing organisation. The elements and electrical components are interchangeable between the four models. The double-pole three-heat switch is a feature of these equipments, and the makers claim to have the largest griller-boilers of any British standard cookers.



The "Rockit" kettle (Geo. Green)

A few months ago Simplex gave additional support to the "exterior" oven element idea in their new cookers with the flue all round the oven, and since then the new Phillips' cookers with elements entirely outside the oven lining have appeared. We think that the door window and the light inside the oven, which are optional features, might, for the present at any rate, be classed as constructional novelties. Belling stress the idea of seeing food cooking and provide a glass-fronted cooker to implement this idea. We are a little disappointed not to have heard more about the English Electric move in omitting fuses.

B.N.E. draw our attention to their new colonial cooker and say "it may be of some interest to the English housewife." The drop-down door certainly seems to be a stumbling block. No doubt, space saving considerations have a bearing on this, in theory if not in practice. Nevertheless, Moffats seem to be "getting away" with it. Oven grilling is by no means confined to colonial cookers nowadays, and a good many of the ovens of the smaller cookers referred to are served by the boiler-griller or separate top elements for grilling. Ideas on the relationship between the griller-oven element and the supplementary heating are very diverse, however. The bottom element loading varies from, say, 400 W, as with the booster element of the "Intermediate" Phillips' cooker, to about 1,500 W as main heating.

Facilitating Cleaning

We welcome the support given to the association of efficiency (general) with cleaning. A few of the more recent moves in this direction are the hinged element assembly of the Met-Vick boiling plates, the flush fronts of the Carron "A" cookers, and the G.E.C. development for the prevention of the ingress of moisture and grease up the inside of the rims of hot-plates. The last-mentioned scheme embraces a new type of backplate having a turned-up edge fitting into a slot round the lower edge of the hot-plate rim.

Jackson Boilers "Junior" model

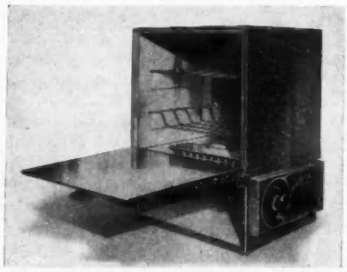
Because we believe that eventually cooking equipment must embrace a section of water-heating apparatus devoted entirely to cooking service, for the heating of water for cooking and for washing essentially belong to different fields, we welcome the Hotpoint cooker-water heater combination, but the higher temperature requirement for cooking-water is one main point. The boilers produced by Messrs. Jackson Boilers, Ltd., are designed to give a continuous supply of boiling water at a definite rate. One model delivers 40 pints of boiling water per hour on a continuous basis after the initial heating up. It is loaded at 2.5 kW.

Kettle Development

We must not under-rate the value of the electric kettle, however. It is easily the most important cooking-water heater that we have for small quantities. Our first impression from a general perusal of a few catalogues is the wide disparity of loadings, which range from 750 W for a three-pint unit made by Grafton Electric to 1,800 W for a kettle of the same capacity produced by Messrs. Bulpitt & Sons, Ltd. Grafton make a point of economy (16 pints of water boiled for 1 kWh), while quick boiling is, of course, the feature of the Bulpitt appliance which is claimed to boil three pints in five minutes. The high loading is obtained by shaping the immer-

Left to right: A Bulpitt electric kettle made of heat-resisting glass; a broad-base kettle for "open" plates (London Aluminium); and a Sloan electrical model

sion element. Messrs. H. G. Moseley & Co., Ltd., attach much importance to the hard wearing afforded by the refractory element (850 W) in their 2½-pint kettle. A 3½-pint, 1,000-W kettle listed by the Sloan Electrical Co., Ltd., operates automatically on the safety-fuse principle, while two other safety ideas employed by Premier Electric Heaters, Ltd., are the "Accident-proof" unit in which reconnection is effected by fitting a new sleeve nut, and the "Quickset" which is reset simply by pushing in a plunger.



A Kubex oven with infinitely variable control

The latest contribution to "automatic" equipment is the "Rockit" kettle (George Green & Co.). The supply is cut off when the water is reduced to a low level, but while the element is still covered. It is made in four sizes, from two pints (700 W) to six pints (1,800 W). We much prefer the "universal" voltage equipment in which there are distinct circuits for different voltages to the "universal" idea which provides for inefficient working at a lower voltage. We have heard many favourable reports as to the utility of the combined kettle and saucepan, such as that produced by Bulpitt, particularly when it is used as an accessory to a complete cooking outfit.

Conversion of ordinary non-electric kettles and saucepans is a good idea, and for this purpose George Green supply a special immerser. It is only necessary to cut a small hole in the utensil and to clamp up the immerser by a locknut and washers. Portable liquid heaters (immersers which are just dipped in) do much to popularise electrical appliances, and are described as indispensable by consumers who have experienced the first benefits. The Green loop immerser (500 W) is heavily silvered and speedy heating is stressed for the heaters manufactured by Domestic Electrification, Ltd., on

A Domestic Electrification liquid heater

account of their cylindrical shape which affords a large emission area (domestic models 500 W to 700 W).

There is a very wide range indeed of cooking equipment for table-top use which is particularly serviceable for supplementing larger equipment, representing economy to the consumer, and we suggest that the manufacturer, and indeed the supply engineer, would benefit considerably by pushing this idea.

The B.N.E. "Radiant" griller boiler has a grilling space of 7¾ in. by 12 in. by 10¼ in. and is loaded at 2 kW. A new G.E.C. table cooker is complete with an enclosed grill chamber and an 8-in. diameter boiling-plate, while a 2-kW element serves for both operations in the new griller-boiler of the same make. "Box" ovens such as the "Kubex" (900 W, 12 in. by 11 in. by 10 in.), and the unit supplied by Grafton Electric Co. (750 W, 15 in. by 9¼ in. by 7½ in.) should be included under this heading, and so should breakfast cookers, of which the following are just a few selected at random. Belling, 2,000 W, 10¼ in. by 10¼ in. by 4¾ in., boiler-griller; Carron, 6¼ in. by 11¾ in. by 12 in., boiling plate and separate grill; English Electric, 2,000 W, 12 in. by 9½ in. by 6½ in., boiler-griller and extension shelf; and Veritys, Ltd., 3,000 W, 16¼ in. by 12¾ in. by 11¾ in.

A new "Magnet" table cooker

The extended hob idea is becoming more popular and various forms of boiling rings with it are the Belling oblong unit with rounded ends, 1 kW, 12¾ in. by 6¾ in.; and the Premier "Multi-boiler" with its 12-in. circular overhung hob which will accommodate three saucepans with room for drawing aside for simmering. No doubt the multiple-plate unit is more efficient than the single-plate equipment for more than one utensil, but the industry has already recognised that often thermal efficiency must be regarded as subservient to cost and size. In the new G.E.C. double cooking plate each section is separately three-heat controlled.

We would not like to see the term "warming" plate disappear. This point arises out of a comparison of Premier hot-plates of 120 W, 10 in. diameter and 700 W, 7 in. diameter, and of boiling-plates made by Messrs. W. T. French & Co., Ltd., at 400 W, 5 in. diameter (closed machined top) and 1,500 W, 9 in. diameter (open).

Fires which can be tilted back for cooking purposes have definite value in the bedroom, and examples are the Arora equipment with 1½-kW loading and three-heat control and the Premier "Manifold" 600-W unit. In the catalogue of Sun Electrical Co., Ltd., we see illustrated the Stokes table cooker which serves many well by its "inverted cooking" during rush breakfasts, and a steam cooking outfit with three or four pans in tier formation and with two immersion elements in the water chamber at the bottom.

A "Premier" warming plate

"Service" Appliances

It is time that a better distinction was drawn between the mainly utility class of table equipment referred to above and appliances which, by their attractive appearance and artistic design are specially suitable for use on the dining table and sideboard. The manufacturer and salesman know that, properly handled, this class of apparatus represents good business and, in the hope of rendering assistance, we suggest "service equipment" as a broad designation for all electrical ware of this type. There is a large amount of this more expensive apparatus, but the following selections will advance a few ideas for business. Sun Electrical Co. mobile buffets like dinner wagons with the trays equipped as warming plates, the sides being covered in, with doors on one side (sizes from 15 in. by 24 in., 500 W to 24 in. by 42 in., 1,400 W); Messrs. Cooper-Stewart Engineering Co., Ltd., boiling plate (6 in. by 6 in., 600 W) and waffle iron attachment which replaces the turn-over toast rack on the company's horizontal toaster; Bulpitt, attractive complete tea service with kettle to match and coffee percolator and kettle in heat-resisting glass; Arora, warming plate (18 in. by 9 in. by 6 in., 160 W); French, coffee percolator with a glass cover (2 pints, 400 W) and others with detachable insides, and plate warmers (24 in. by 12 in. by 5 in., 300 W); Premier, egg boiler (three eggs, 320 W) and coffee percolator with cut-glass top and bakelite handle (400 W, eight cups); Messrs. H. G. Moseley & Co., Ltd., porcelain hot-water jug and a coffee percolator (350 W); B.N.E., waffle irons fitted with heat indicators, sandwich toaster with convertible grids for use as waffle iron, teapot in which the infuser is raised without lifting the lid, and coffee percolators "to grace any table"; and Messrs. W. T. Henley's Telegraph Works Co., Ltd., wafflers, each with two separate pairs of grids loaded at 400 W each, and with pilot-lamp indication.

A "Sunoo" coffee percolator set

Toasters, of course, are essentially service equipment, but we treat them apart because they already have so definitely established themselves as utility dining-table equipment. French, Premier, Grafton, Moseley and B.N.E. are all makers of the automatic bread turning type, while in a model of the last-mentioned make the toast is ejected from the "oven" at a predetermined time.

Finally, electric cooking equipment nowadays must include non-electric utensils specially designed for service on hot-plates, such as those produced by Messrs. Hague & McKenzie, Ltd., Bulpitt & Sons, and the London Aluminium Co.

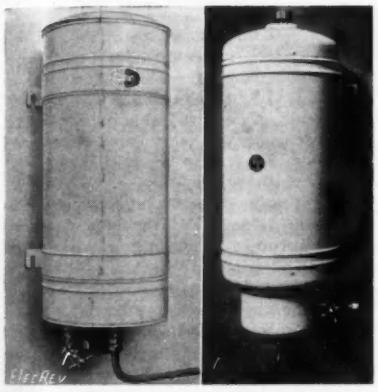
The photograph at the beginning of this article was taken by courtesy of Mr. Robert Lee, chief electrical engineer of St. Pancras.

Water Heaters—A New Outlook

No household can be said to be up-to-date to-day which has not an abundant supply of hot water available. In this article we endeavour to point out the most suitable electrical equipment for each individual requirement. Fashions in water heaters are changing, and manufacturers will do well to study the requirements of the market and plan well ahead.

THERE are two main reasons for a change of outlook which is taking place among water heater manufacturers generally—the increasing tendency for the supply industry to recognise that small houses as a whole represent by far the biggest field for load building, and the rapid increase in the number of consumers of electricity for water heating due to recent intensive small-house building activities. Generally speaking the ordinary thermal storage water heater does not meet the requirements of this type of consumer, whose wants, apart from small quantities of hot water, are confined to bath supplies at less frequent intervals than those for which the thermal-storage equipment is particularly suitable. For occasional use storage equipment is too expensive in itself, and standby losses are an important consideration.

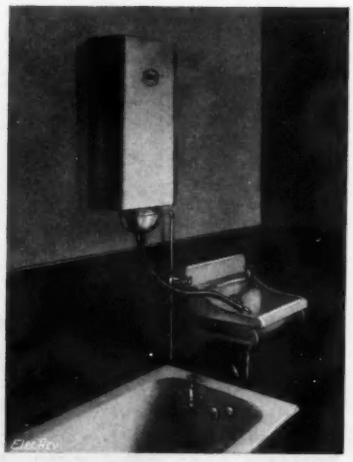
On the other hand the thermal-storage heater is here to stay and in its own field there is ample scope for less spectacular, although more important, development, It is towards higher loadings that this new outlook is leading, and it is with much surprise that we learn of a 10- to 12-gal. heater loaded at 12 kW. This "Rapid" heater, introduced by British National Electrics, Ltd., is fitted with a circulator to enable small quantities of water to be obtained very quickly. The Geyser Manufacturing Co. makes a strong point in connection with its 3-gal. and 12-gal. heaters (2 and 4 kW) that it has no intention of putting this equipment up for competition with thermostatically controlled apparatus. The development is solely for bathroom service, for which the makers say maximum heating speed is not necessary. The time the bathroom is occupied determines the greatest possible speed requirement. The tanks are unlagged.



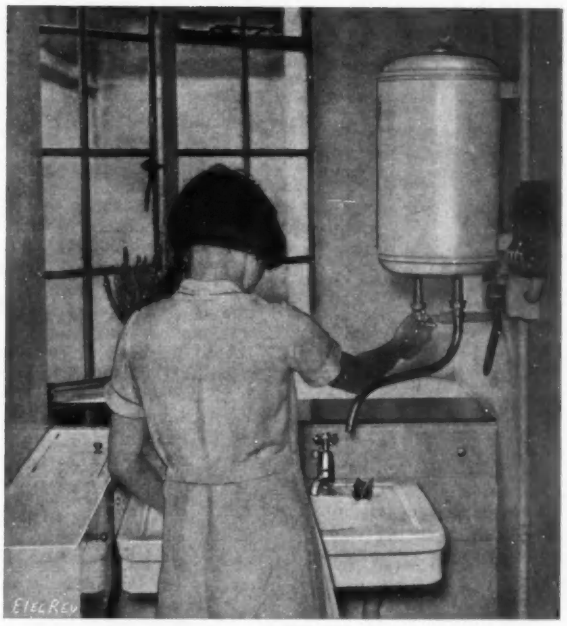
10-gal. 4-kW Ferranti high load unlagged cylinder and Reyrolle storage heater

Heatrae, Ltd., has recently introduced an unlagged tank fitted with a circulator, while Messrs. Benham & Sons, Ltd., market single-case storage cylinders unlagged but complete with elements and also a thermostat if required. A 10-gal. unlagged tank just introduced by Messrs. Ferranti, Ltd., is loaded at 4 kW. It is arranged for non-pressure operation and the size of the inlet pipe is ½ in. The heater is designed specially to provide at least some hot water immediately after switching on, and it is intended for hand control only.

Equipment supplied by Domestic Electrification, Ltd., affords an interesting comparison. There is an automatic bath boiler in 12 to 30-gal (1,000 to 2,000 W) sizes and the non-automatic "geyser-action" type which includes 1½-gal. (1,000-W) and 12-gal. (4,000-W) sizes. Messrs. Eastwoods, Ltd., have introduced a 12- to 15-gal. bathroom equipment loaded at 2, 3 or 4 kW with hand control. It is of the displacement type with a broken feed for direct water connection, and with 4-kW loading it is said to heat up from cold in three-quarters of an hour.



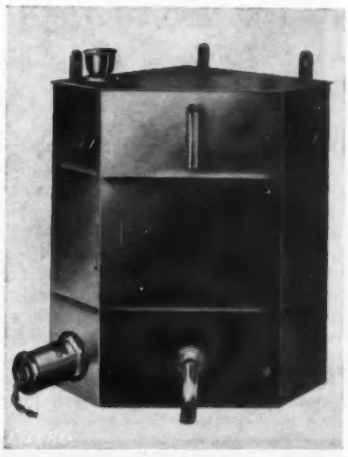
Domestic Electrification "geyser-action" bath boiler



The "Artisan" heater produced by Messrs. George Green & Co. (12-gal. 3-kW), is fitted with a circulating tube and has a ball valve directly fitted into the hot-water chamber in one model and in a separate cold-water chamber in a second model. The extension of the "Sanspray" (Santon, Ltd.) to the field of thermal-storage equipment is an indication of the support given to the idea of spray bath equipment with predetermined temperature.

The Outlook for Geysers

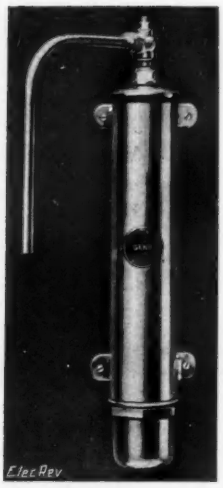
With the tendency to permit higher loadings the geyser manufacturers' hopes will increase. It is the only form of electric heating with no stand-by losses whatever and an overall efficiency of 98 per cent., say Messrs. George Nobbs, Ltd., and it will meet requirements for from practically continuous flow to, say, a dozen uses a year with equal efficiency. Santon's claim is that the geyser is the simplest and safest equipment on the market for quickly raising the temperature of water.



Hand-controlled angle tank (Geyser Manufacturing Co.)

The geyser definitely supplies hot water at the rate at which the water is heated and is essentially a high-load equipment. It is most important to keep that fundamental fact in view and not to confuse the issue. We agree that the geyser principle can be applied to several types of apparatus on the market, but only in that they heat the water at the rate at which it enters, such as in the larger displacement tanks produced by Messrs. Bastian & Allen, Ltd., and not because they *supply* hot water at the same rate. In the new cistern water heater produced by Messrs. Johnson & Phillips, Ltd., cold water from the cistern first goes into a separate heating chamber in which it is raised to draw-off temperature before it flows over into the storage chamber. This can be completely exhausted with all the water at maximum temperature. The rate of feed is so proportioned that it has reached the storage temperature by the time it spills over.

Benham cistern storage tanks are so designed that only the hottest water can be drawn off from the containers. Eastwoods' storage geyser gives any quantity of water up to one



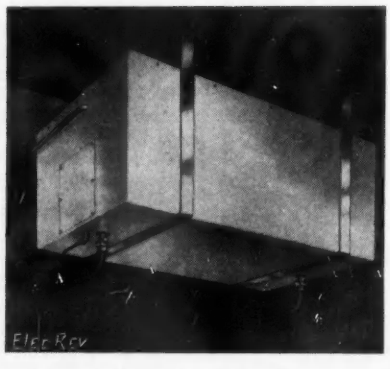
A. Geo. Nobbs geyser

gallon in one heating at any desired temperature. The control valve handle and scale are marked for setting both the temperature and quantity of water required, the control being interlocked with the outlet and the switch. Water at the selected temperature rises in the graduated gauge glass, and when the desired quantity of hot water has accumulated delivery results from turning the handle to the "off" position. Quicker delivery is obtained from one model by virtue of two separate compartments, one chamber loaded at 3 kW being fed from a storage section with a permanent low loading.

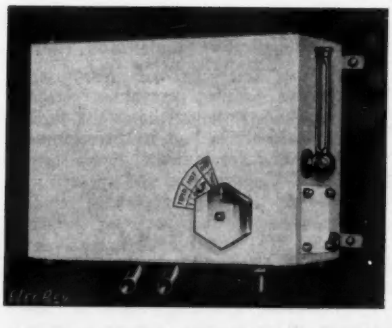
Messrs. A. Reyrolle & Co., Ltd., say that in their storage equipment they have taken care to ensure bottom heating to get the maximum quantity of hot water. Quick heating, however, is not solely a question of high loading. Mr. Robson (George Nobbs) stresses the point that greater service can be given without increasing the size of tank or loading by means of booster heating. This, of course, depends on the kind of service to be given, and there still remains a promising field of study for both the manufacturer and the installation engineer.

Extended use of storage equipment and demands for space saving have led to moves for quicker recovery in connection with the usual types of storage heater. In the "Quick Recovery" heater, introduced by English Electric Co., Ltd., the emission area is much increased by reason of the finned case, while the hollow immerser now employed in the circulator by Simplex Electric Co., Ltd., heats both ways, into the circulation path and out into the bulk of water. All circulators, we consider, are primarily intended to provide small quantities of hot water quickly.

The General Electric Co., Ltd., refers to an automatic vent valve which provides immediate flow from the outlet under all conditions. All this company's non-pressure heaters, by the way, have tinned-copper interiors, thus conforming with the general move to render the hot water supplied by smaller equipment suitable for drinking. We commend this move as one contribution towards the idea of more closely associating a particular section of water heating with cooking, and we suggest that in the classification of small equipment more attention should be given to the kitchen and less to the wash basin. General classification seems to be: non-pressure, wash basin; pressure, mainly bath-room; cistern, general service. The following are sizes recommended by Simplex: 1½- to 5-gal. for wash basins; 12-gal. for one hot bath daily and washing supplies; 15 to 20-gal. for two hot baths daily and general supplies; and 30-gal. for three or more baths daily.

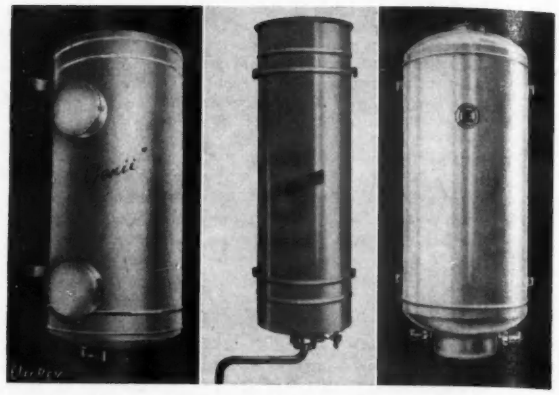


J. & P. rectangular ceiling-mounted unit



Automatic "storage geyser" (Eastwoods)

For the class of consumer referred to at the beginning of this article we think an extended service to the kitchen as well as the bath room could be profitably offered by a Heatrae double-outlet non-pressure tank with the second outlet in the kitchen with a tap. The second outlet can only half empty the tank, to a level above the top of the element. Domestic Electrification, Ltd., supplies a scullery boiler in sizes from 1½- to 5-gal (500-W to 750-W); the company gives a consumption figure of ¼-kWh to raise 1 gal. to 180 deg. F. The Heatrae "Quick Service" heater is loaded at 4 kW, and the heating units are so arranged that small quantities of hot water are available almost immediately after first switching on, while if the switch is left on for 30 to 45 minutes sufficient water for a good hot bath can be obtained. This heater is intended essentially for use in the small house where baths are wanted on specific occasions and the requirements do not justify an automatically controlled storage heater.



"Genii" 30-gal. cylinder with booster; B.N.E. "Rapid" 12-kW, 12-gal. model; and English Electric 12-gal. pressure type

In water-heating for the small house space saving is particularly important and already several means have been adopted. The most popular idea is the rectangular tank because it will more readily fit into corners with less projection. There are new B.N.E. tanks in 1½- to 5-gal. sizes, and the new Heatrae "Flat 2" rectangular heater (2-gal.) is specially designed to afford minimum projection. In the heaters produced by Unity Heaters, Ltd., projection is reduced by placing the twin cylinders within a rectangular casing. The cistern heater introduced by Messrs. Johnson & Phillips is specially designed for limited space and is normally suspended from the ceiling and wall. It is a horizontal model with a side element. Simplex have introduced a rectangular tank as small as 1½-gal. But the last word, we should think, in taking advantage of building structural features is represented by the "made-to-measure" tanks of Thermics, Ltd. They encourage ceiling mounting where space is usually not so valuable. Other shapes of tanks also result in space saving, some examples being the high loading heaters made by Geyser Manufacturing Co. which are in "D" and angle shapes.

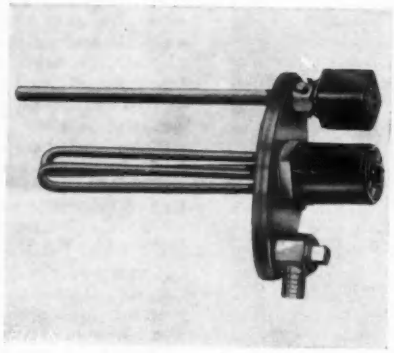
The under-basin heater is another space saver in its particular field, and Benjamin Electric, Ltd., stress its suitability for bedroom use. There should therefore be a profitable field for it in hotels and boarding houses. Apart from space-saving, an important point about the "Reymez" (Reyrolle) pedestal wash basin, with its storage tank inside the pedestal, is the need for only one inlet cold-water supply pipe instead of the usual three pipes for hot and cold water service.

Conversion Schemes

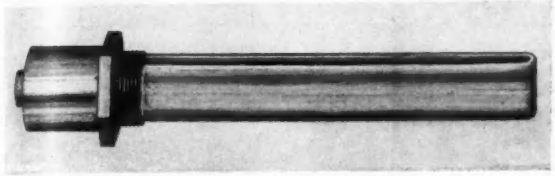
Probably the biggest field of development at the moment is in connection with the conversion of existing fuel-fired hot-water systems, for which there are many self-contained automatic outfits with easy fixing arrangements. Aidas Electric, Ltd., the Hotpoint Electric Appliance Co., Ltd., and Siemens Electric Lamps and Supplies, Ltd., have already met with much success in this development. B. N. E. have a new combined heater and thermostat for side entry with oval fixing flanges. It is

A "made-to-measure" tank (Thermics, Ltd.)

light and compact and supplied with loop-rod tubular elements. Messrs. George Nobbs have conversion sets with short immersers and oval flanges with two tappings, one for the heater and one for the thermostat, and also with standard flanges with 3-heat control. Both the heater and thermostat can be unscrewed for cleaning without removal of the flange and heaters, or other loadings can be substituted without alteration. The same company has introduced immersers with short projections (3-kW, 10-in.) and we understand that a 6-kW model will soon be available with a projection of only 8 in. Benham's emphasise the importance of the withdrawal element because of the non-interference with the water system. The G. E. C. has withdrawable immersers with two circuits for 3-heat control, and in connection with its blade-type immersers for use where space is a consideration it stresses the importance of fitting such equipment horizontally in the tanks with the blades in the vertical plane. An interesting comparison in this company's list is a 3-kW blade immerser with a 9½ in. projection and a 3-kW withdrawable immerser with an 18-in. projection. The Arora Company has a range of immersers with withdrawable elements, jointing



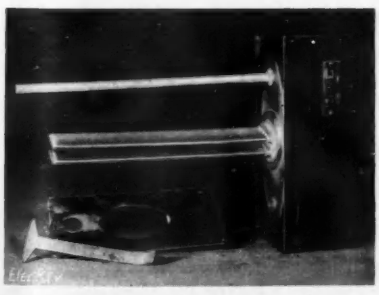
Hotpoint self-contained automatic conversion set



Blade type immerser (Geo. Green)

rings and inner castings, to facilitate bolting up. A Johnson and Phillips' immersion heater is of tubular pattern with a hexagon flange to take a spanner when fixing. Eastwoods manufacture conversion units with two-way flanges, withdrawable heaters, and adjustable thermostats. The Heatrae "Ace" a.c. automatically controlled immersion heater is self-contained within a 2-in. pipe threaded head. It is designed for horizontal working and is suitable for fitting through the side of the tank. The thermostat can be externally adjusted.

Where small supplies of hot water are wanted quickly the internal circulator is very popular. Reference has already been made to the Simplex hollow immerser unit. In connection with the G.E.C. withdrawable immerser a point is made of placing the element as near as possible to the bottom of the tank; hence the equipment is available in a variety of lengths. The George Green unit, which is designed to eliminate vapour and steam pockets, has elements which reach the bottom of the tube. Then there is the Aidas sheathless circulator with its circulation path between the four separate and sheathed elements. The external circulator has not nearly such a big field of application, but it has a particular use in connection with booster heating for existing systems. The booster supplied by Messrs. Bulpitt & Sons, Ltd., is designed for mounting alongside tanks at the correct height to ensure automatic filling, and an Arora unit is specially suitable for coupling to existing flow and return circuits. The installation man is poorly served with water-heating data, and formulæ published by George Green for calculating load requirements (particularly for conversion schemes), and curves published by Eastwoods enabling easy determination of the outputs of hot water at various loadings, should prove very valuable.



Siemens self-contained automatic conversion set

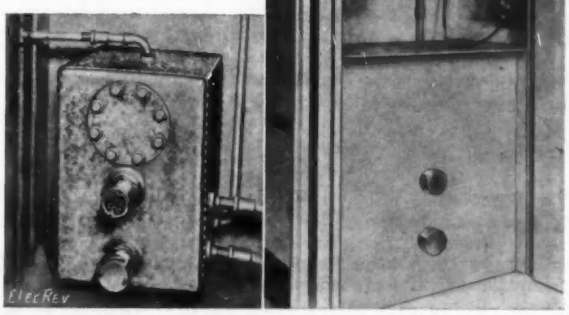
Efficient heat insulating is vital to the success of any conversion scheme, and nowadays there are available insulating mattresses which can quickly be fitted in position *in situ*. Arora, Messrs. Drake & Gorham, Ltd., and Messrs. Chance Bros., Ltd., are among the makers of these. The insulating medium of the last make is glass-silk, and a strong point is made of the fact that it is vermin proof. Provision for easy temperature regulation has been responsible for a good deal of business. To quote only two examples, Berry's Electric, Ltd., provide simple temperature regulation by mixing hot and cold water at will in their "Canvary" self-contained heaters, while for conversion equipment in the approved circulators supplied by Messrs. Ferranti, Ltd., thermostat temperature setting can be varied by a dial.

Reduced Scaling

Furring up of the inside of apparatus, particularly the elements and the thermostats of water heaters, is still the biggest trouble with which the maintenance engineer and, therefore, the manufacturer have to contend. However, it seems fairly certain that the matter is well in hand; at least the anti-scale fight is intense. It is generally agreed that reduction of temperature at the emission surface is the way to reduce scaling. This reduction is brought about in two ways: First, by quick dissipation of heat by employing embedded elements, such as those of the Hotpoint "Torribar," with its stainless-steel sheath, and the Chromalox units supplied by Messrs. George Bray & Co., Ltd.; and, secondly, by increasing the emission area.

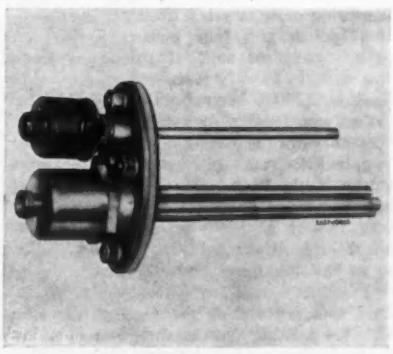
The finned case of the English Electric "Quick Recovery" heater has a density loading of 10 W per sq. in. of emission area. In the latest Sadia heaters, in which the heat is transmitted through a special non-deteriorating fluid, the emission area is doubled. Reyrolle multiple elements result in 7- to 8-W load density, while 2 W per sq. in. is given for the flexible immerser supplied by the J. P. Tubular Heater Co.

In keeping the element chamber automatically filled with distilled water lies the success of the "Densacone," now supplied by Benjamin Electric. The Simplex hollow immerser affords an increased area, and the makers are giving considerable attention to apparatus - plate component clearances, and to larger bore and straight outlet pipes.



Converted tank fitted with G.E.C. 2-kW immerser and thermostat, before and after lagging

Easy cleaning methods are akin to anti-scaling methods, and apparatus-plate clearances have an important bearing on this, a point which is emphasised by English Electric. Benjamin, Eastwoods and Green all have apparatus with removable tops to afford easy access to the heater interior. The Benjamin unit is a small displacement heater for use with soft water, and it has not a separate apparatus plate. The Green removable top is a copper spinning without bolts or rubber washers.



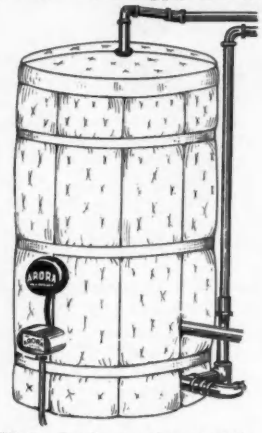
The Eastwood conversion unit

New B.N.E. rectangular tanks have an arrangement on top for cleaning out the out-

let cap, and the pipes of the "Rapid" heater are easily removable for de-furring. Eastwoods' answer to the water-connection difficulty mainly peculiar to flats and small pre-war houses having only a direct water main supply is that the self-contained cistern tank can be fed direct and requires no expansion pipe. They make such heaters in sizes from 5 gal. (1,000 W) to 30 gal. (3,000 W).

B.N.E. automatic combined cistern tanks have interchangeable connections, so that the apparatus can be adapted for either constant temperature or constant volume.

There is a type of water-heating which is not covered in the foregoing because it is not catered for normally by standard equipment. We refer to the bulk heating of water for common use in large blocks of flats. The use is essentially domestic, but the schemes usually adopted are of the types more often employed for industrial work because of the large quantities of water dealt with.

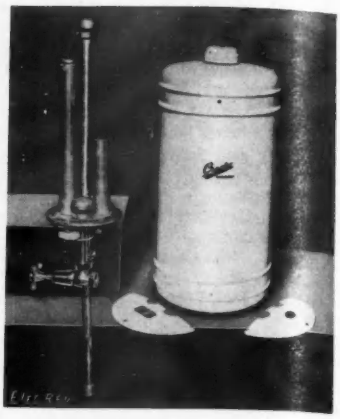


Water heater equipped with Arora heat-insulating mattress

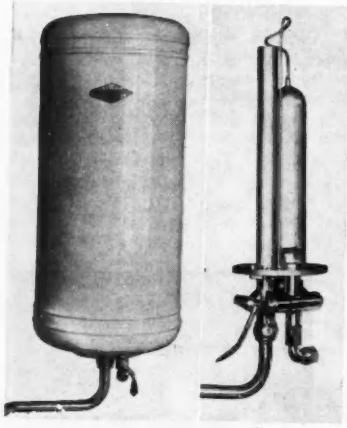
Builders and architects are up against the cost of chimney stacks for solid-fuel systems and, therefore, the possibility of electricity supply is nearly always considered in the early planning days of the scheme. Self-contained individual water heaters are generally objected to on the score of the space occupied.

At ordinary tariffs bulk water heating is considered too costly, while for normal night heating the necessary provision of basements is often a serious barrier to electrical progress.

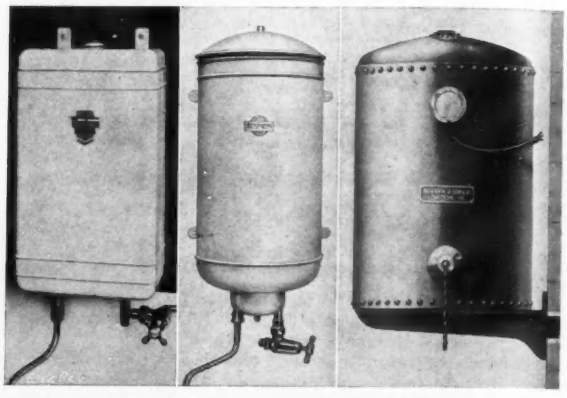
One suitable method is the provision of a storage tank in the roof fed by a comparatively small boiler situated on the top floor under the roof tanks and operated in conjunction with the latter on the circulation system. The boiler is connected to the electricity supply during the night only, the tank being emptied of hot water as required during the day and filled from a cold-feed tank when the electricity is switched on.



Dis-assembled "Creda" easy-cleaning water heater



Aidas anti-scaling heater and apparatus



Heatrae small projection "Flat" tank; easy-cleaning heater (Benjamin) for soft water; and single-case unlagged storage cylinder (Benham)

A corner of the Kensington and Knightsbridge Co.'s Brompton Road premises is illustrated in the heading block of this article.

The History of the Electric Iron

AN interesting insight into the development and methods of manufacture of the electric iron, particularly the "Premier" iron, was given at the annual general meeting of the London Demonstrators' Circle of the Electrical Association for Women on Monday last at its headquarters in Regent Street. After a display of the film, "The Birth of the Premier Electric Iron," with a commentary by Mr. C. G. Pitcher, Mr. G. H. Collins, director of Premier Electric Heaters, Ltd., and one of the pioneers of electric-iron development in this country, indicated the complex nature of its construction.

Although called an "iron," he said, there was a lot more in it than that. The base and press-plate were, however, of cast iron, of which there were many grades. For the "Smoothwell" iron a good close-grain iron was necessary, cast under proper conditions, to avoid porosity and ensure a surface which would polish and take plating well when ground. During the 200 years or so that irons had been in use for laundry work various other materials, including brass, steel and aluminium, had been used for their construction, but cast iron was now universally employed on account of its high capacity for heat and because it did not chill rapidly when applied to semi-wet articles. Steel was rather cheaper, but was liable to go out of shape. Recent experiments with glass had failed on account of its extremely poor heat conductivity (about a thirtieth of that of iron), and even if mechanical difficulties could be overcome glass would split up, due to the low rate of conduction causing unequal stresses.

Although the normal temperature at the face of the iron was about 500 deg. F. for ironing cotton and linen articles, that of the element must necessarily be much higher. Frequently, too, the iron was left on to get to 700-800 deg. F., and occasionally even allowed to reach red heat. For this reason it was important that the mica insulation used should be capable of withstanding these high temperatures.

Thirty years ago mica was not used for this purpose, the heating element being generally cemented into the base or embedded in vitreous enamel. Under these systems, however, only a light loading was possible, and the irons were not very reliable. About this time experiments were carried out in Germany in depositing gold and platinum on the bottom of enamelled saucepans, &c., and it was found that very high resistances could be obtained because of the thinness of the film, it being quite easy to arrange for a good distribution of the heat.

Actually this was found rather expensive because the enamel was liable to crack during or after firing, and consequently damage the metallic film with it. Eventually it was found that mica would take the deposit, and this led eventually to the development of the "Prometheus" system.

The British patent rights of this system were bought by the managing director of the company by which Mr. Collins was employed, and he was sent to Frankfürt in 1902 to learn the details of manufacture. At that time the design of the apparatus made in the German works was greatly in advance of anything made in Great Britain or probably in America.

On his return from Germany a factory was opened at Kingston-on-Thames, and about four years later the Premier Electric Heating Co. (now Premier Electric Heaters, Ltd.) was formed to manufacture apparatus using the same type of element, but wire or ribbon wound instead of film. For a long time the Prometheus system was predominant, but Premier persevered with its own element, which had now proved satisfactory for many years. For the higher temperatures required to-day the wire-wound element was essential, and, in fact, was now in universal use.

Home Laundering Made Easy

Efficient as our modern commercial laundries undoubtedly are, a great many housewives still prefer to do the work at home, looking upon the weekly clothes wash as one of their essential duties. At the same time they are eager to lighten the task, which in the ordinary way is one of untold drudgery, and this they are able to do very definitely with the aid of electric clothes boiling, washing, wringing, ironing and airing apparatus. Such equipment is now better and cheaper than ever, and with the low two-part tariffs in force in most towns operating costs are almost insignificant.

MODERN electrically heated and motor-driven appliances enable the housewife to launder clothes and linen at home quickly and easily. Pressure cleansing reduces the wear and tear as well as the manual labour which hand scrubbing involves, while the power-driven wringer and damp-ironing attachments in conjunction with indoor dehydrators and airers ease the task when inclement weather prevents outdoor drying.

For the provision of hot water and the boiling of soiled garments Burnley "Burco" wash-boilers are made in many styles. Type 591 is designed for builders' requirements. It has a hinged lid and draw-off tap with removable handle. Three-heat control is provided by two shrouded switches in the lower part of the galvanised casing.

The Burnley builders' pattern wash-boiler

Eastwoods' automatic boilers, electrically welded throughout, are made in 6, 8 and 10 gal. sizes, the larger models being fitted with two switches. The inside percolator causes the boiling water to rise up a central column and to be sprayed downward.

There are two G.E.C. types, the cheaper having 500 W strip elements (3,000 W total) and two foot-press switches, while the other has 3,500 W hot-plates in the base with a three-heat reciprocating switch which may be mounted on a wall block if desired. The 8 gal. size has a lift-off lid and the 10 gal. a hinged lid with an internal percolator to assist quick cleansing. The switches are shrouded and a tap is provided.

Green's wash-boilers are provided with an immersion heater element from which the clothes are protected by a removable perforated tinned copper cover. A three-heat switch is mounted on a wooden wall block, but a less expensive model is made with a modified form of heater controlled by foot-press switches fitted into the outer casing of the boiler.

Hawkins's models, including one of 6 gal. capacity, are bucket-shaped and supported on a tripod stand. They are fitted with a percolator, tap and lift-off lid. The galvanised or enamelled "Dragor" boilers (Drake & Gorham Wholesale, Ltd.) have 3-kW three-heat control with a hinged lid and tap. New Bulpitt 5-8 gal. "Wonder" boilers are made of heavy-gauge sheet metal, hot spelter galvanised, the exterior finish being blue mottled enamel. A percolator is fitted and two-heat 1,800/500 W and 2,250/750 W elements with a safety protective device are provided.

In the "Sunco" range there is a Jackson rectangular boiler with a flat table-top. Two foot-press switches are provided for heat regulation, the "Chromalox" elements being of 3.2 kW. An automatic cut-out and "Perco-Wash" sprayer are extras.

Domestic Electrification boilers are obtainable with removable or half-hinged lids. A three-heat bakelite switch is provided. The Amplec range includes the 7-gal. "Satis," in which provision is made for earthing the clamped-on heating elements. There is a draw-off tap with a removable handle. The "Modern" is square and has a rotary switch, other models being round and galvanised or colour-enamelled. Safety cut-outs can be fitted and enamel table-tops are available for fitting over the hinged lids.

"Magic" vacuum cup washing machine

Verity's boilers may be had with a half-hinged lid, or a flat table-top which, when reversed, forms a clothes tray, the handles being specially shaped to hook on to the rim side of the boiler. The 3-4-kW element is controlled by two s.p. switches, shrouded or recessed in the side of the boiler. The 3-4-kW "Siemens Xcel" has an enamelled loose flat cover and the top is provided with a recess so arranged as to drain back the water overflow when removing the clothes. The Falk, Stadelmann boilers have "clamped-on" elements and two 15-A "kick" switches.

Washing Machines

The English Electric colour-enamelled washing machine is a newcomer and is distinctive in appearance. When closed it forms a useful table. Silent operation is achieved by the special design of the driving motor and auxiliary machine-cut gearing. The square casing not only encloses the motor and other working parts, but by providing an air gap between the tub and the casing it also forms an air insulation space which prevents the water in the tub from cooling too rapidly. A three-winged rustless-metal agitator oscillates backwards and forwards through 180 deg. The wringer is a self-contained detachable unit which can be locked and used in any of six positions. The roller shafts are protected by end-shields which prevent contact between the clothes and the bearings. There is even pressure over the whole length of the roller, and a simplified patented safety-release with automatic resetting device is incorporated.

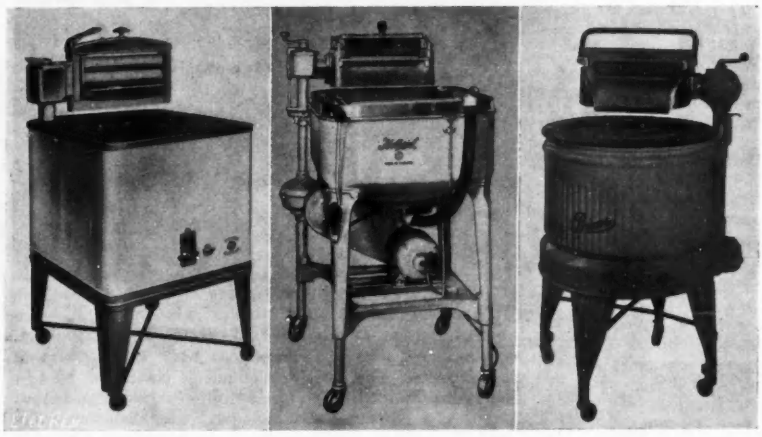
Drake & Gorham Wholesale "Competitor" wash-boiler

The British National "Universal" models are available complete with wringer and interchangeable ironer attachment. A self-emptying pump may be added. The largest is a twin-tub type having a centrifugal dehydrator capable of damp-drying the contents of the 12-gal. washing tub in approximately four minutes.

"Genalex" (G.E.C.) machines have an enamel finished welded tub on four caster legs. The agitator is driven by a 0.25 h.p. motor and this also serves to drive the wringer, which is interchangeable with a flat ironer consisting of an electrically heated power-driven roller. The rectangular "Margery Daw" washer (George Green & Co.) is unusual in that it is electrically heated and may therefore be used as a boiler only if desired. It is of 12 gal. capacity, has a draw-off tap and a 3-kW "Gee-Gee" immersion heater. The

agitator is hand-operated and the makers state that any type of small wringer may be clamped to the top of the container of the washer.

A sunken gyrator works in conjunction with a square-shaped tub in the Hotpoint-B.T.H. machine, so producing a double surge that forces the soap-laden water through the fabric. A power-driven flat ironer is interchangeable with the wringer, which has a soft rubber upper roll. The tub has a sediment trap, a hinged flat top and telescopic legs.

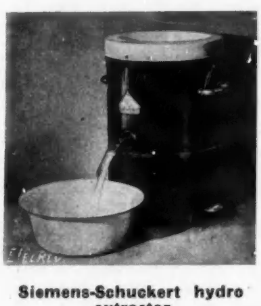


The new English Electric washer (left) with Hotpoint and Dulcetto-Polyphon machines

The Sparton model 50 " Norge " is of large capacity, capable of dealing with a maximum of 9 lb. of clothes at a time in a white porcelain tub.

This machine's special claims to superiority are made in respect of the driving motor and gear mechanism, the steel wringer head and convenience of the controls. A Falk, Stadelmann washer-wringer is enamelled in colour and trimmed with cadmium plating. The Hawkins washer is also colour-enamelled and is driven by a ¼ h.p. Westinghouse motor, a flat-roll ironer being interchangeable with the wringer attachment.

In place of the usual gyrator the MacGregor and McCullum " Magic " washer has three vacuum cups inverted at the end of a vertical rod. The device is caused to rise, make a partial revolution, and then fall on a different part of the " wash." This action causes the warm sud-water to be squeezed and sucked through the clothes. The seamless porcelain-enamelled tub takes 6 lb. of dry clothes and has a wringer attachment. The " Magic Major " is of 8 lb capacity.



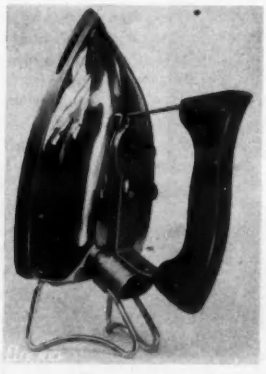
Siemens-Schuckert hydro extractor

The Hurley " Thor Electric Servant " is a rectangular cabinet with a flat table top and storage locker in the base. It houses a clothes washing machine with an interchangeable power-driven wringer-ironer attachment, in addition to which a food mixing machine may be employed and driven off the same shaft.

The improved Dulcetto-Polyphon " Prima " washer has a streamline appearance and is finished in pale green enamel picked out in red and black with decorative plating. Two types of wringer are available, the slightly more expensive one having non-crush rubber rollers and being particularly easy to clean or adjust. The loading is 260 W. A pump for emptying can be incorporated if desired and an ironer is supplied for fitting on instead of the wringer.

Ironing Equipment

The model 58 "Thor" portable press ironer has just been introduced as an alternative to the rotary type. The upper concave ironing shoe has square corners at one end and is rounded at the other end, providing 260 sq. in. of ironing surface. The heating element is in two circuits, each of 650 W, with two control knobs and two thermostats permitting temperature ranges of from 250 to 450° F. The shoe is attached to an arm hinged to the base casting, allowing automatic adjustment for varying thickness of garments, pressure being similarly varied from 400 to 600 lb. Two operating levers are provided, one for lowering and raising the shoe and the other for applying the pressure. By requiring the simultaneous use of both hands for closing the shoe, risk of trapping the operator's fingers is avoided. The machine is constructed entirely of aluminium, its net weight being 33 lb.



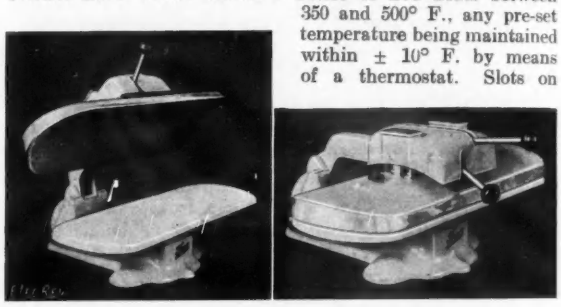
Siemens-Schuckert automatic iron

A 500-W 5½ lb. iron marketed by the English Electric Co. has a streamline front with tapered point for fitting into ruffles and a bevelled edge for going round buttons. The sloping handle has an adjustable thumb rest; while the side-entry connector has a flex grip, and a heel rest is provided.

French " Univolt " travelling irons in a carrying case weigh 2 or 3 lb. and have a loading of 300 W. Larger standard models are made. G.E.C. " Magnet " irons are either plated or colour-enamelled and carry a five years' guarantee.

A new sloping " easy grip " handle and an angle-entering " Anka " connector are features of Hague & McKenzie's " Pyramid " iron. Moseley's " Eddo " range includes a traveller's iron with an unusually shaped handle.

One of the Premier range incorporates a " Birka " thermostatic switch for automatically regulating the temperature, while the side-entry connector embodies a small signal lamp serving as a reminder to switch off. The Siemens-Schuckert " Protos " iron is automatic in action. It is loaded to 800 W and is suitable for a.c. only. Beneath the handle there is a control knob which affords a choice of five heats between 350 and 500° F., any pre-set temperature being maintained within ± 10° F. by means of a thermostat. Slots on each side of the point enable one to iron underneath buttons.

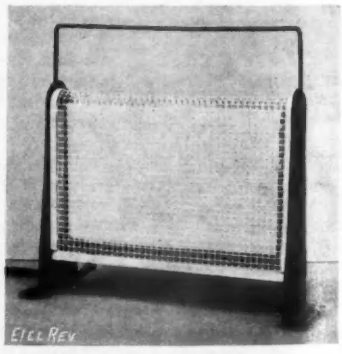


New Thor portable press ironer

Besides a small coloured traveller's iron the Falk, Stadelmann range includes an automatic model with a thermostat operating a switch contact at three temperatures which are pre-set by a knob lever under the handle. Hawkins side-entry irons include a traveller's universal voltage model in which there is an aperture for heating curling tongs.

The British National side-, angle-, and top-entry models include a wrinkle-proof rounded-heel iron that glides backward and sideways easily, as well as an automatic pre-adjustable temperature iron for a.c. only.

In the " Sunco " range is a new connectorless model with a safety cord grip fixed connector device (permanently attached flex) to avoid breakdown at point of entry. The Premier " Super-Smoothwell " has a " Sun-Vic " regulator for automatically preventing excess temperature. Berkeley & Young 450 W side-entry models include one having a moulded handle and a button groove that extends all the way round the sole plate. The " Siemens Xcel " range includes a tourist's 200-W iron



English Electric Handidryer

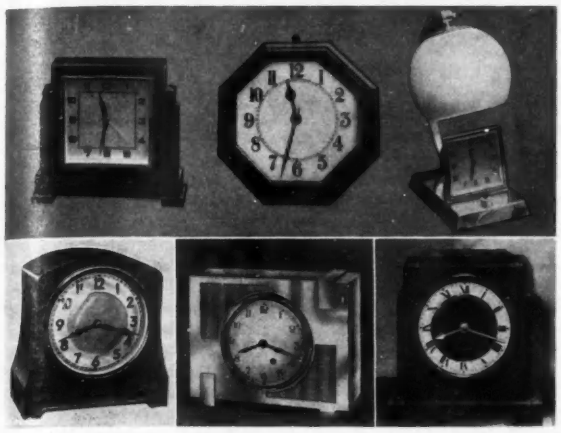
(*Concluded at foot of next page*)

Electric Timekeeping

Whether plain, striking, chiming, or of the alarm pattern, common features of all synchronous a.c. mains-driven clocks are their simple construction and unfailing accuracy in timekeeping. They are quite silent in operation and never need winding.

BESIDE stereotyped designs Messrs. L. G. Hawkins & Co. offer combinations of electric clocks and reading lamps, among which are attractive "Supreme" models incorporating statuettes and cigarette lighters.

Messrs. Everett, Edgcumbe were pioneer a.c. clock makers; their "Synclocks" include half-hour strikers and 4/4 Westminster chimes, fitted with oil bath self-starting synchronous Warren-type driving motors.

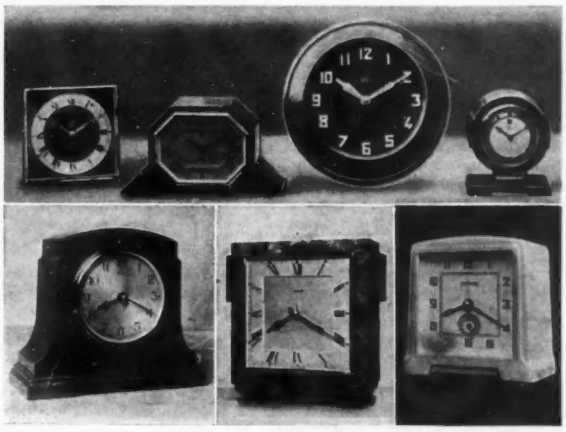


Above: Three clocks by the Euston Manufacturing Co., Ltd. Below: A group of "Temco" models

This season's range of Ferranti clocks is being increased by new models, particularly of the sizes with 6 and 8 in. dials. A further development is the introduction of an alarm clock incorporating not only a 24-hour alarm system but also an attractive illuminated dial.

This company has also specially designed a clock for fitting into the front panel of a.c. mains-driven radio receivers. Two clips are provided to facilitate fixing without the use of screws. Circular bakelite drum movements are available for converting spring-driven clocks with dials of from 3.5 to 12 in. in diameter.

"Euston" timepieces fitted in coloured bakelite cases are available with either angular or stepped side pieces in contrasting colours. They measure 8.5 in. wide by 7.5 in. high and over twenty different colour contrasts are offered. Wood cases with plated figures can be built into existing surroundings to match furnishing schemes. Model 5445 comprises a bedside lamp embodying a synchronous clock, chromium plated and fitted with coloured glassware and a small push switch.



Four timekeepers by Smith's Electric Clocks, Ltd., and (below) examples of Ferranti clocks

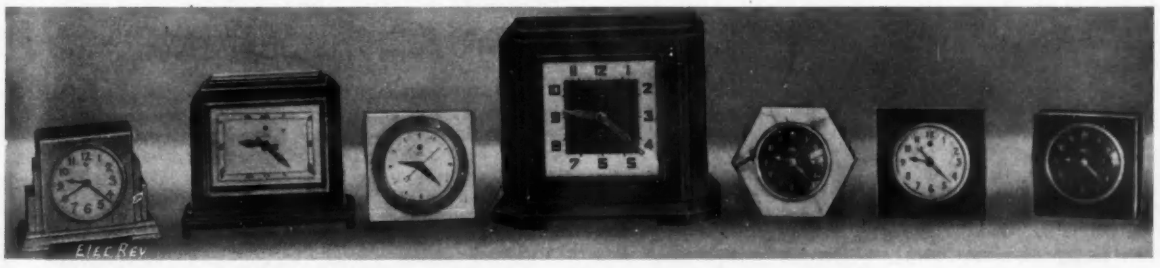
British National synchronous a.c. mains-driven clocks in various styles and figure woods are elegant in appearance. Rectangular French clocks are produced in oak and plated metal with ornamental statuettes.

A "Genelex" (G.E.C.) selection is available in wood, metal and moulded bakelite cases; there are also striking and chiming types, grandfather and bookcase designs, and sheet glass dials illuminated by 30-W "Osram" striplights.

Among Smith's synchronous a.c. timepieces in a great variety of styles are striking and chiming clocks and grandfather models. To the range of boudoir alarm clocks a new model has been added with a dial that can be illuminated at will by a small lamp bulb concealed behind the bezel. The alarm control knob also serves as a lamp switch, the bulb deriving its supply from the mains through an additional coil provided on the stator winding which forms a low-voltage transformer.

Gent, "Sunco," Philips, T.M.C.-Harwell ("Temco"), "Synchronome," and Tyme are other well-known makes, while a large selection of Bulle battery-energised timekeepers is available.

The true value of time can only be properly appreciated when accurate timekeepers are used. Three minutes a day lost by one hundred workpeople through clocks being unreliable can cost their employers nearly £80 a year on a wage rate of only a shilling a hour.



A range of "Synclocks" (Everett, Edgcumbe & Co., Ltd.)

Home Laundering Made Easy *(Continued from preceding page)*

weighing 2¾ lb. and having an easily removable handle for packing in a small box; its voltage range is from 90 to 250 V. Other makes of electric irons include the Cooper-Stewart 3 lb. and 6 lb. models, the 425-W Belling, the "Grafton" and the side-entry Phillips' "Workjoy."

Drying Appliances

The new Siemens-Schuckert centrifugal "Protos" dryer is claimed to be the only machine of its kind on the market for household use. It is small enough to be transportable and obviates wringing and mangling by whirling clothes damp-dry in three minutes. The enamelled sheet-steel 60-W type will accommodate one set of sheets and pillow slips, or eighteen face towels. The 90-W galvanised model is of double capacity. The upper portion of the Economic "Eco-Dry" cabinet contains a pull-out rack on which to hang garments and lower down there is a draw-out wire tray, while the heating element is in the base of the welded sheet-steel cabinet, which has a hinged door and is asbestos lined. Three-heat control is provided with loadings of from 2.25 to 8 kW. Glover's new "Kubbey" cabinet has an interior tilt-rack, double doors and, although designed primarily for airing clothes, can also be used for drying purposes.

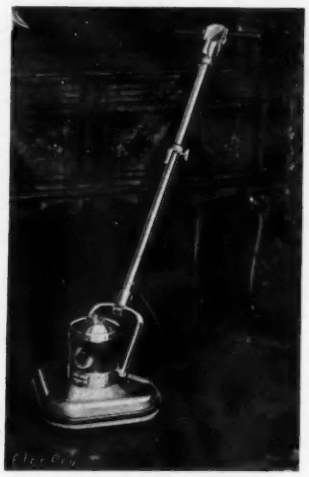
The new English Electric "Handidrier" is a safe, economical and convenient device. It has a low-temperature convector element protected by a wire guard. Above this is a telescopic rail, adjustable for height, over which light garments may be hung for drying, or the heater may be placed inside a wardrobe or cupboard for airing purposes.

We are indebted to Mr. Robert Lee, chief electrical engineer of St. Pancras, for permission to take the photograph at the beginning of this article at the Corporation's electricity showrooms.

Vacuum Cleaners and Polishers

In the electric cleaning sphere the greatest advance seems to have been made by floor polishers of which there is now a wide selection. That is not to say that the vacuum cleaner is standing still: many improvements and refinements have been made in these machines and there are several newcomers.

AN electrically driven machine for washing, scrubbing and drying floors is being placed on the market by London Electric Appliances, Ltd. Two models will be available, a large one and a smaller one for household use. The tank for containing the liquid is attached to the handle and is detachable from the motor-driven head of the machine.

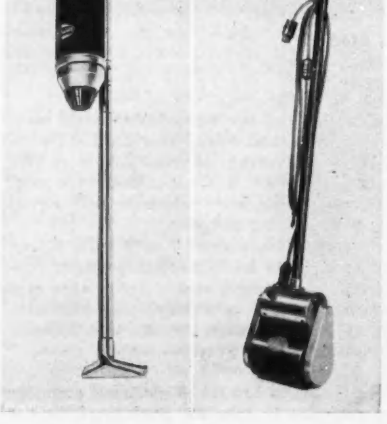


Electrolux floor polisher

The "Auto-Maid" floor polisher is a small size universal voltage machine with a shock-proof handle. The fibre brush is driven at high speed by an enclosed motor. The device glides along by its own power, without exertion, only needing to be guided.

The "Electrolux" polisher is triangular with a vertical motor. It has three circular brushes, two revolving in one direction and the third in reverse. Separate sets of brushes are used for waxing and polishing, and three felt discs for the final buffing operation. They are easily detached and revolve at 750 r.p.m., while the air stream for cooling the motor assists in drying the polish. The machine is universal with special models for low voltages and high frequencies. The 200-W motor has ball bearings, and a foot-operated snap lock keeps the handle erect.

The floor polisher sold by Messrs. L. G. Hawkins & Co. has a very light handle and a single 6.5 in. diameter brush revolving at 1,000 r.p.m. over which a felt pad can be slipped for finishing. The Morris "Siroma" effects dual polishing by a revolving brush parallel with, and double belt driven by, the motor and a felt pad at the foot of the "broom handle" also acts as a brake. A foot clip near the bottom of the handle enables this to be secured roughly normal to the cleaning plane for convenience when carrying the machine from room to room.



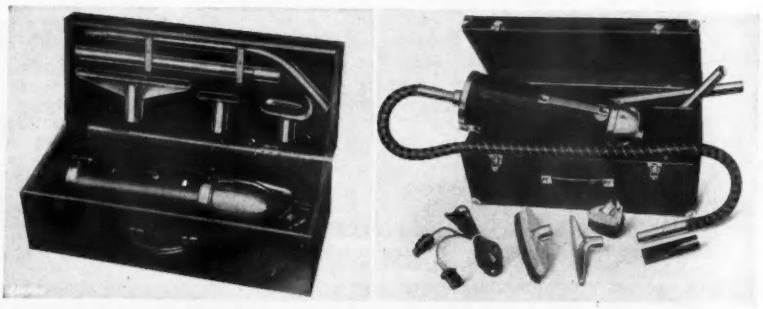
Cooper-Stewart vacuum cleaner (left) and Auto-Maid "Simplex" floor polisher

The triangular "Vactric" has three interchangeable disc brushes, and will both wax and polish floors. The twin brush "Magnet" (G.E.C.) is fitted with a rubber edge ring which acts as a protector buffer between the polisher and any furniture it may come into contact with.

A dust extracting device has been added to the new model Electrona "Duplex 75" floor polisher, which has two circular brushes. A suction fan is mounted in a chamber below the vertical driving motor, revolving at armature speed. It extracts dust and grit from the floor as polishing proceeds and exhausts into an external dust bag suspended from the guiding handle. This device prevents grit being ground into the surface. The dust bag has a trap to prevent the contents falling back into the fan chamber and a quick-release clip for emptying.

The recently introduced Cooper-Stewart vacuum cleaner is novel in form, being of the lightweight "walking stick" type. No flexible hose is needed, and the removal of half the suction tube converts the machine into a handy duster. The dust bag and motor are enclosed in a bakelite covered cylinder attached to the suction tube. No radio interference is created.

In the "Goblin" (British Vacuum Cleaner & Engineering Co.) range is the lightweight "Ideal," with a 150-W motor,



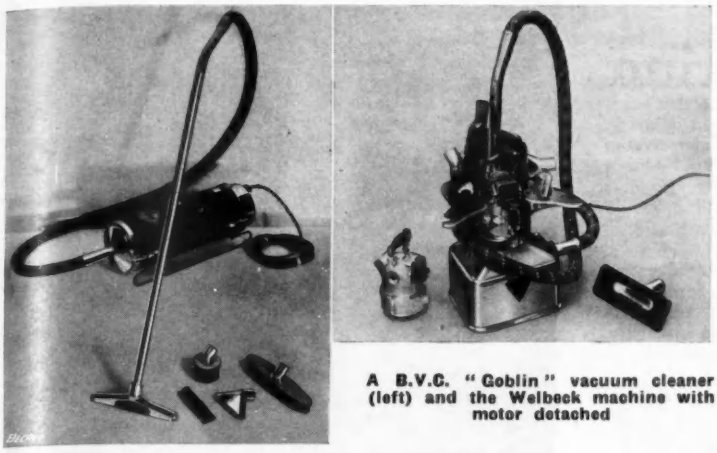
Siemens "Xcel" (left) and Sloan "Summit" (right) suction cleaners

turbine unit, and dust bag contained in a cylinder forming part of the handle. The "Wizard" has an external dust bag and is light enough to be used single handed when the handle is detached. There are also cylindrical runner models and a de luxe outfit in a storage box. The "Major" is cylindrical also, but on wheels instead of runners; the multi-stage fan is driven by a ¼-h.p. motor, and an agitator swivel carpet nozzle of the broad flat type is provided.

The "Hotpoint Junior," which has an external dust bag, now has a better finish, and other details have been improved. The motor-driven brush imparts a beating and sweeping action that loosens grit and clinging litter. The Moseley "Eddo" is finished in blue and aluminium, with an external dust bag.

The "Newmode" is of exceptionally light weight and small dimensions. Its design is unconventional, the motor being part of the handle, which is extended to form a broom-like nozzle supported on two small wheels and fitted with smooth fibre carpet "strokers." The handle is hollow and its reverse end can be used for suction cleaning also, with or without flexible hose. An unbreakable window shows the amount of dust passing through, and the external dust bag is attached to the handle, but does not need to be emptied. The dirt is trapped in an inside fibre container, which is easily removed and destroyed complete with its contents, fresh fibre containers being obtainable at trifling cost.

The Sloan Electrical Co.'s cylindrical "Summit" is provided with a leather-cloth-covered storage box. Extra attachments include a metal clip-on nozzle brush and a paint or disinfectant sprayer. The Gilbert standard "Polar Cub" has no



A B.V.C. "Goblin" vacuum cleaner (left) and the Welbeck machine with motor detached

attachments, a hand model being sold as an accessory. Messrs. Hawkins' "Supreme" cleaner has an external dust bag and an extra wide nozzle in which is a belt-driven brush. A switch on the motor housing starts the machine when the handle is lowered to the operating position, and stops it when returned to the upright position. A blower or sprayer attachment can be used in place of the dust bag on the "Supreme Ferret" hand duster.

The "New Welbeck" (now associated with the B.T.H. Co.) is a canister machine with bottom skids to facilitate movement. Its rectangular shape enables it to stand on stairs and minimises circular swirl round the filter, which is thus kept reasonably clean, the air flow remaining nearly constant and most of the dust falling to the bottom of the container. A large bakelite nut forms an insulating swivel hose coupling, which will not pull out of the container. The bakelite double-action nozzle has a smaller aluminium nozzle inside, which is normally raised free of the carpet by means of springs. Mounted on it is a short brush with stiff bristles let into its front edge, and to bring this into action for removing clinging litter the inner nozzle is depressed by slight additional pressure on extension rods. A tool rack enables all accessories to be carried on the machine itself, while the 175-W motor is detachable for use as a blower or with a sprayer attachment.

The "W.R.C." cylindrical cleaner is mounted on skids or three wheels as desired, and it has a rexine-covered storage box. The lightweight "Morris" has an external dust bag and the motor is fixed half-way up the "broom handle," the whole outfit weighing 8 lb. The nozzle has a swivel joint and revolving brush beater, driven by rollers in contact with the floor.

The Vactric "Airflow" has an external dust bag and is of the motor-driven brush type. A foot switch provides for half speed operation, and the nozzle height can be changed by a "Pres-toe" adjuster, an indicator showing the nozzle height without bending down. A small hand duster is also available.

The "Mary Ann" (British Electric Domestic Appliances) is described as a double suction two-way cleaner; it has an extended range of accessories, including a disinfector and deodorisor and an exit air filter pad. Another model is the new "Bedalax," covered with coloured leatherette. The motor is universal and, in place of the usual thin-lipped carpet nozzle, there is a broad nozzle with a swivel to ensure that it remains flush with the surface being cleaned. A cotton-pick-up device is included with an air purifying pad. Both machines are of the cylindrical runner type.

British National "Universal" vacuum cleaners comprise two motor-driven brush models and three straight suction machines, all of the external dust bag type. There is a new extra-lightweight model and also a small hand dusting machine with a deodorisor blower.

The "Ediswan" cleaner has an external dust bag and the carpet nozzle has a soft bristled stationary brush for dislodging grit from the surface of the fabric, as well as a set of dusting tools.

The "Electrolux" "Model 25" machine is cylindrical on runners, with accessories in a storage box. An external indicator shows when the dust bag needs emptying, and a dry polisher is provided. There are special models for pressures as low as 50 V and frequencies up to 100 cycles.

London Electric Appliances floor scrubber and dryer (left) and G.E.C. suction cleaner

The "Model 800" Hoover cleaner is "stream-lined" and its air suction lifts the carpet up from the floor; the agitator beats the carpet and dislodges the dirt and soft brushes sweep up clinging threads and fluff. "Model 450" is lighter and lower in price, and there is also a larger machine—"Model 925." A complete set of dusting tools is available for each. The Hoover "Junior" is a lightweight machine, and the "Dustette" can be used in one hand.

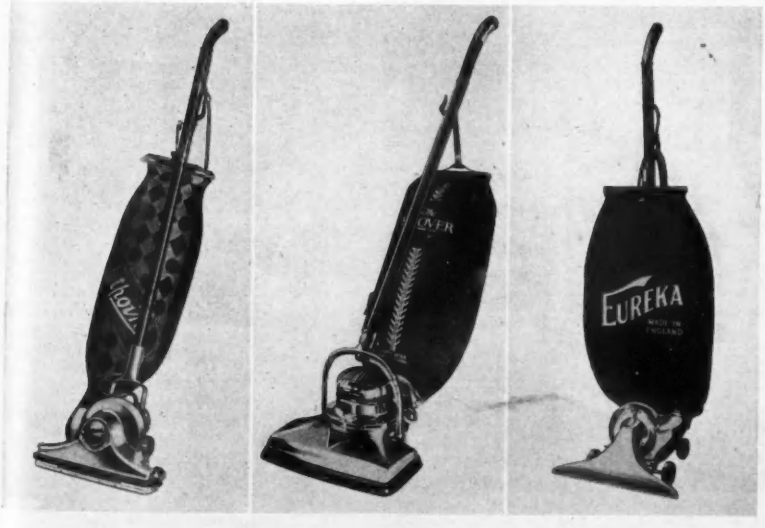
The "Magnet," with an external dust bag, has a motor-driven brush extending the full width of the nozzle, which is of generous dimensions and has a furniture buffer all round, with a simple adjustment to suit varying thicknesses of carpet. Every moving part is fitted with ball bearings, and the lowering of the handle to the working position starts the motor.

The Ismay "Electrix" has a rexine-covered steel cylinder, cellulose sprayed inside, with a welded seam. The universal 260-W motor drives a twin impeller, having grease packed ball bearings.

A thumb-screw enables the nozzle of the "Eureka" cleaner to be adjusted to any sort of floor covering. The nozzle can be detached and an extension hose coupled in its place.

Siemens "Xcel" 250-W cylindrical cleaner on runners is finished in coloured enamel and is packed in a storage box. Messrs. Falk, Stadelmann have two sizes of cylindrical runner cleaners.

The Kensington and Knightsbridge Co. gave us facilities for obtaining the picture which heads this article.



Hotpoint, Hoover and Eureka vacuum cleaners

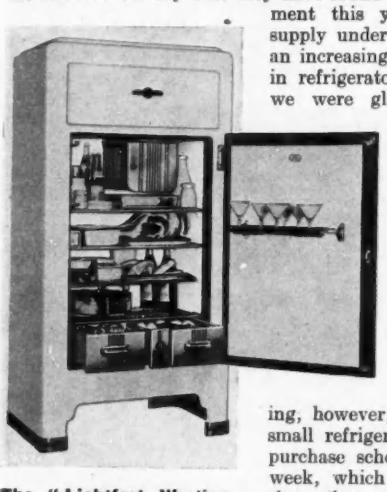
Progress in Refrigeration

This has been a progressive year in the refrigerator industry, despite the fact that little effort has been made to attract sales by introducing special or unusual designs. Energy has been directed more to showing the public the necessity for refrigeration, and at least two companies have reported an increase of over 100 per cent. in their sales as compared with last year.

MOST of the larger manufacturers have introduced a small top-entry model with an internal capacity of about 2 cu. ft. In this type there is a lift-up lid instead of a front-opening door, and its compactness and low price makes it particularly suitable for installation in small houses and flats.

The most popular size, however, is still about 5 cu. ft., since by far the largest number of refrigerators are bought on the hire-purchase system, when the difference between the weekly or monthly costs is not so apparent.

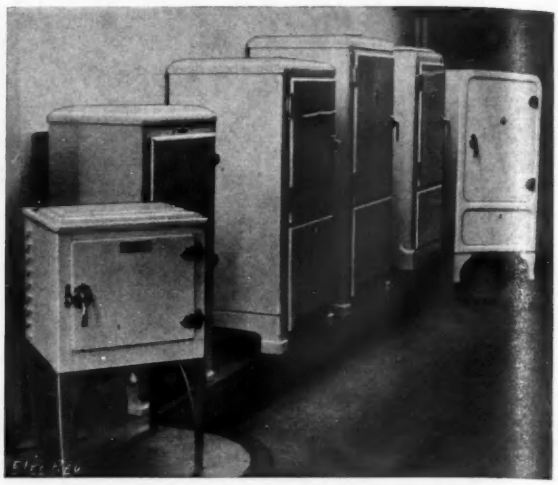
During the year there has been a prolonged refrigeration campaign in the London area by gas interests, which served to stir up the electricity supply industry to the value of refrigeration. Both International Refrigerators (B.T.H.) and the H.M.V. Co. say that they have found a marked improvement this year. Indeed, the supply undertaking is becoming an increasingly important factor in refrigerator selling, although we were glad to learn from several companies that builders have not been slow to realise that a built-in refrigerator is an important "talking point" when selling a house. The West Ham Corporation supply undertaking, however, is already selling small refrigerators on the hire-purchase scheme at 2s. 3d. per week, which is a lower figure than the gas companies have offered.



The "Lightfoot Westinghouse DLX-95"

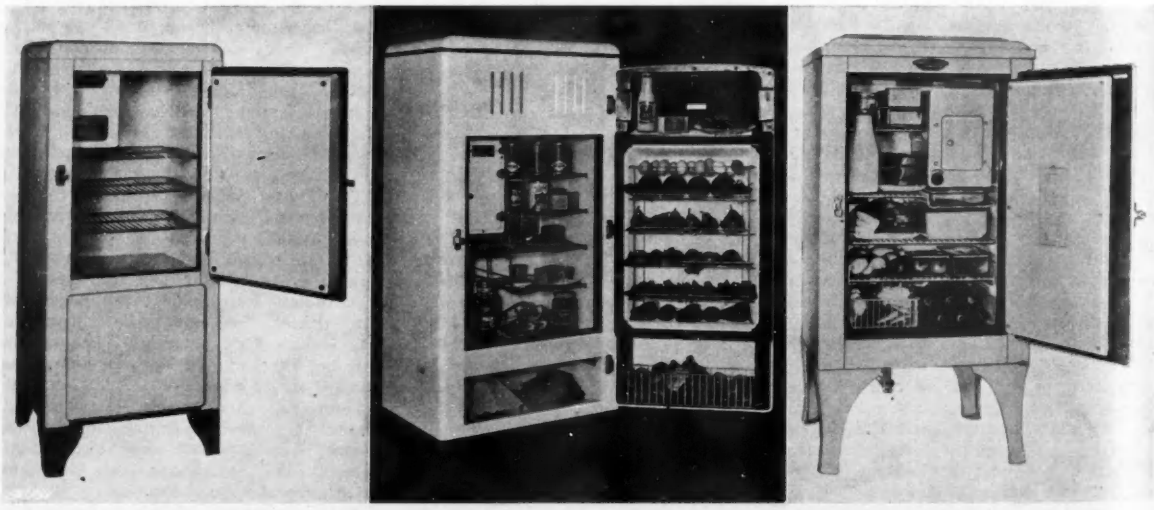
The advantage of a refrigerator load is, of course, that it is practically constant. American statistics have shown an average annual revenue per kW of demand of £4 17s. 2d., as compared with £2 10s. for cookers, 11s. 3d. for vacuum cleaners, and 10s. for irons. It has been estimated that out of the 20,000,000 wired homes in America 7,000,000 have refrigerators. This is, of course, partly due to the greater extremes of temperature, but to a larger extent to the education of the public in such matters.

Mr. Sheridan, managing director of British Electric Domestic Appliances, Ltd., who make the "Aerofrige" model, has just returned from a visit to Canada and the United States. There, he says, on the selling side, high-pressure salesmanship counts for almost everything, although a good deal of attention is paid to fittings such as special pudding trays and ice trays, which, combined with a good exterior appearance (colours, incidentally, have been tried and dropped), do as much towards selling the refrigerator as actual performance. He found that refrigerators were used in winter to almost the same extent as in summer, as in large centrally heated flats and small kitchens the temperature in winter is frequently higher than in summer.



Although there is a very wide range of refrigerators available, all except two are run by a motor compressor. Of the exceptions, which are of the absorption type, one, the Electrolux, is well known. So far as we are aware, this is the only company to make a 1-cu. ft. refrigerator; this is available also as a built-in model. The latest introduction, however, is type "LJK," a 4-cu. ft. model, incorporating a rubber ice tray, a reversible shelf, a double-size "vitaliser," a "utility" basket for eggs and vegetables, and ten-point temperature control. On all "Electrolux" machines porcelain enamel is used for the internal finish and cellulose enamel externally.

The other machine of the absorption type is made by Ismay Zeros, Ltd. This machine operates on the Normelli principle, of Continental origin, incorporating a generator-absorber, intermediate container, evaporator coil, and a condenser which is gilled for radiation air cooling, so that no water circulation is needed. Ammonia is gasified by the application of heat three times every 24 hours, each cycle being completed in eight hours (1.5 hr. heating and 6.5 hr. cooling). Apart from the Venner time switch, there are no moving parts and no thermostat is incorporated as this would obviously be superfluous. A five-year guarantee is given, and 2.25-, 3-, 4.25- and 7.25-cu. ft. models are available. In the case of the Electrolux models, however, water cooling is used for some of the larger appliances.



The "Aerofrige" (British Electric Domestic Appliances, Ltd.), the "Tri-Shelvador" (A. J. Balcombe) and the new "Electrolux"

The B.T.H. models (International Refrigerators Co., Ltd.) have, with the exception of the "Liftop" top-entry model, a hermetically sealed naturally air-cooled compressor above the refrigerator. This company and the Lightfoot Refrigeration Co., Ltd., which makes a range from the "Compact" top-entry model to the "DLX-95" (9.5 cu. ft.), are, we believe, the only concerns to give a four-year guarantee, apart from the "Zeros" refrigerator, which is guaranteed for five years. The Lightfoot Company also has a hermetically sealed unit above the cabinet, but a forced draught is employed.

Other features of the "Lightfoot-Westinghouse" are the special porcelain-like "Dulux" enamel finish and the drop-down tray in the door of the larger models, while the latest model, the "DLX-95," incorporates a large number of refinements, such as a salad crisper, dairy basket, fruit bin, and a special revolving shelf, allowing articles at the rear of the cabinet to be obtained without removing those at the front—a feature worthy of wider adoption. A new introduction is the 3½-cu. ft. model with front door opening and the compressor above the cabinet, while an improvement in the appearance of all sizes has been brought about by rounding off the corners.

This year marks the twenty-first anniversary of the Kelvinator concern, which has available equipment from 2 to 12 cu. ft. Interest is centred around the two top-entry "Kelvinettes," one ("LT-2") having 2 cu. ft. of storage space, and the "LT-3" 3 cu. ft. of space and incorporating a special "food file," which is shown in our illustration resting on the top of the cabinet. There are twelve freezing speeds and a special "vacation" setting for holidays, week-ends, &c. A domestic cocktail cabinet has also been introduced.

For the time being H.M.V. Household Appliances, Ltd., are maintaining their 1935 range of "Streamline" models, with the addition of a 2-cu. ft. top-entry type. With the exception of this model, of which the lid only is porcelain, the external finish is porcelain in all cases, and this combined with the graceful lines and black feet gives a very attractive appearance to the range. A special feature is the "Silent Circulator," which has only three moving parts, running in an oil bath.

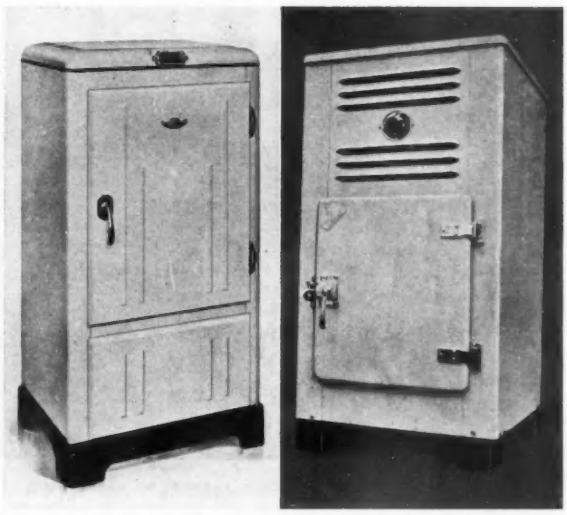
From Leda Electric we understand that the popular 5-cu. ft. model is being retained, but will be available with rounded edges ("streamlined") at a slightly greater cost. Another type of cabinet which this company has found popular is the 11½-cu. ft. "table-top" for large kitchens, the advantage of this type being the large shelf area and useful "table."

Three companies, Messrs. A. J. Balcombe, Ltd., Messrs. Moffats, Ltd., and the Sparton Refrigeration Co., are incorporating racks in the refrigerator door for the accommodation of such articles as fruit, eggs, butter, etc. In the Moffat refrigerator there are three shelves, but the new "Tri-Shelvador" (A. J. Balcombe) models have a drop-down lift-out tray on an inside top extension to the door so that when removing many articles from the refrigerator they can all be placed on the tray which can then be carried away. There are, in addition, five "shelves," an egg rack and a storage basket fixed to the door. An important point is that since the door is recessed there is no loss of storage space due to the door shelves. The motor and compressor have sprung suspension, while the frame is hung from four vertically disposed spiral springs.

One of our illustrations shows the Moffat "M-66," which is similar in design to the more popular "M-45" (4.5 cu. ft.). During the year improvements have been made to the thermostats, and specially built motors are used with the bearings mounted in rubber to eliminate noise and vibration. Porcelain enamel is maintained as the standard exterior finish for these refrigerators, while the fact that the door extends the full width of the refrigerators, thus eliminating seams and projections, gives an unusual appearance to the models.

A feature, also common to most of the "quality" refrigerators on the market, is an internal light operated automatically by the door. A special novelty is the "toe-trip" release, which enables the door to be opened without using the hands.

Six models, from 3 to 9 cu. ft. capacity, are made by the Sparton Refrigeration Co., and the 6-, 7½- and 9 cu. ft. sizes incorporate an electric clock which defrosts every 24 hours. All except the two smallest models have door racks and a vegetable bin with a drop-down door below the cabinet proper.

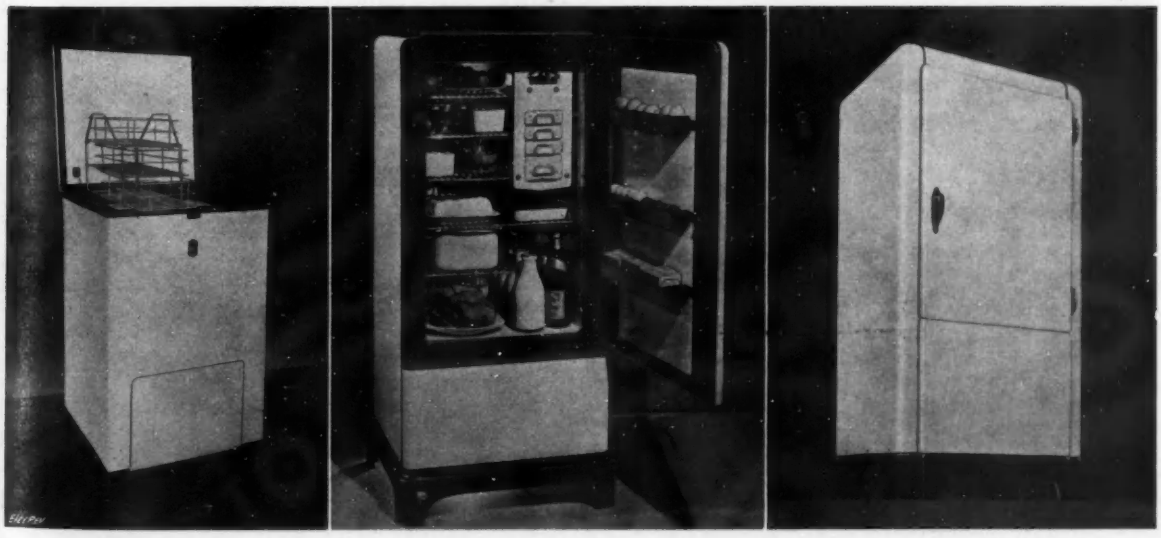


The new "Leda" model, and a "Zeros" refrigerator

A full range of equipment from the "Koldchest," a 2-cu. ft. top-entry model, to the model "9" (9 cu. ft.) is made by Frigidaire, Ltd. Standard features include a hydrator, cold control, automatic defrosting and porcelain interior.

Little advance appears to have been made this year in the development of refrigerators built-in with other equipment. The Pressed Steel Co., Ltd., in addition to its range of standard models, is continuing to make the combined cooker and refrigerator which was introduced a year or two ago, while we understand that a well-known cooker manufacturer has similar plans for the future. Coldair, Ltd., has designed a combined refrigerator and sink as well as a table model with a large vegetable bin and a model designed for building-in. Marco Refrigerators, Ltd., inform us that particulars of their new range are to be issued later.

The collection of refrigerators illustrated in the heading block was photographed at the showrooms of the Westminster Electric Supply Corporation, Ltd.



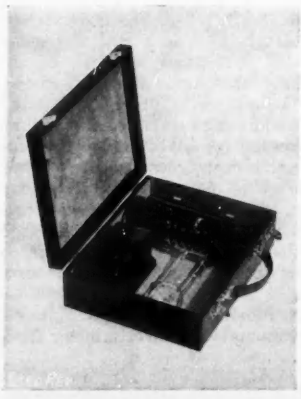
The "Kelvinette" showing the food file, the Moffat "M-66," and an H.M.V. "Streamline" refrigerator

Electric Health Appliances

With the aid of suitably designed apparatus many simple ailments can be safely treated at home without professional electro-medical supervision, while the invigorating value of judicious indoor sun-bathing is acknowledged.

THE Thermal Syndicate's new "Vi-Tan" outfit for the production of ultra-violet light is neat, compact, and robust. It does not need a heavy starting current, and can therefore be plugged into any a.c. lamp or radiator socket. Little visible light is produced, the radiation coming from a "Vitreosil" fused quartz mercury-vapour U-tube mounted on a special transformer. This is housed in an oak cabinet with chromium plated fittings and reflector. Goggles and the flexible plug connector are placed in a compartment of the cabinet when not in use.

A "Thermega" electric blanket in use



The Calvete high-frequency stimulator

The B.T.H. "Mazda" 150-W sun lamp contains a filament that creates sufficient heat for an arc to form between two tungsten electrodes in an atmosphere of mercury vapour, producing visible light in addition to ultra-violet rays. To retard radiation of the heat the glass bulb is fitted with an aluminium cover held in place by spring clips. The floor standard has an a.c. transformer in the base, and a flexible swan-neck support holds the reflector and lamp.

The Hanovia "Homesun Junior" table model will operate on both a.c. and d.c. in any position. It is self starting and does not require tilting. The ultra-violet rays are produced by an electronic discharge high-pressure mercury vapour arc, generated in a tube made of quartz and mounted in an adjustable reflector.

The Cooper-Stewart infra-red ray heater has a bell-shaped reflector mounted on a table stand in convenient portable form; its loading is 500 W. The Medical Supply Association's "Bio-ray" floor standard has an adjustable reflector for accommodating either an infra-red element or radiant heat bulb. The "Medisun" table lamp is a quartz mercury vapour generator of ultra-violet rays with a reflector hood. The Sun Electrical Co., Ltd., supplies therapeutic heaters in a variety of sizes and forms.

The Calvete "Everay" high-frequency outfit is of simple design, and built into a bakelite case. It can be connected to a.c. or d.c. supplies of from 100 to 250 V, and is supplied with three evacuated glass electrodes which glow violet when in use. Another "stimulator" is the "Icall" mechanical massage outfit, which produces vibrations of harmonic regularity. The driving motor has ball bearings and can be run for long periods without overheating. This machine is supplied in a case, together with five applicators and an oiler.

The Cooper-Stewart vibro-massage equipment is unusual in form, being cylindrical and all-enclosed, as distinguished from the more usual box outfit. Messrs. Hawkins' motor-driven massage vibrator is equipped with a speed controller and is supplied with applicators in a box, while the "Vio-ray" high-frequency stimulator is available in three sizes and is adjustable for voltages between 160 and 250 V.

"Sunco" violet-ray outfits are supplied in rexine-covered, velvet-lined wood cases. The "Junior" has a single control and cut-out for voltage and frequency, while the larger models have two output controls, one for current and the other for frequency, with an automatic cut-out on frequency to avoid overloading. There is also a motor-driven massage vibrator.

The Cooper-Stewart vibratory massage device

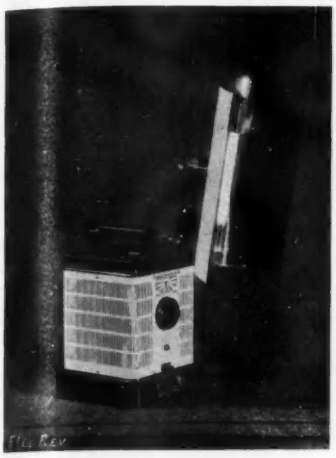
The "Auto-Maid" heating pad and bed warmer is loaded at 60 W; it has two automatic cut-outs and a three-heat switch-regulator. There are a 15 in. by 12 in. size with a washable cover; a 24 in. by 15 in. double pad; and a 15 in. by 12 in. universal voltage (100/250 V) travelling pad. British National "Universal" pads are obtainable with two thermostats, or with three separate controls and four automatic thermostats. Cooper-Stewart hot pads have 16-33-66 W loadings; they are 11.5 in. by 15.5 in. in size and weigh 1 lb., except the "Sung," which weighs 1.5 lb., with an extra cushion. Foot warming pads (50 and 80 W) are also available.

"Thermega" blankets can be used on any voltage between 100 and 250 V, and thermostatic control regulates the tempera-

The Medical Supply Association's "Medisun" artificial sunlight lamps in use

ture. The company supplies heating pads measuring 44 in. by 32 in. and 16 in. by 12 in. Floor mats and motor car mats for 6 or 12 V operation are also produced. Messrs. Hawkins's heating pads are supplied in an assortment of colours with removable washable covers. M. S. A. "Warm-Glow" blankets for single and double beds are made of wool with nickel-chrome wire heating elements. A high-temperature type is available as well as a lower temperature type for domestic use.

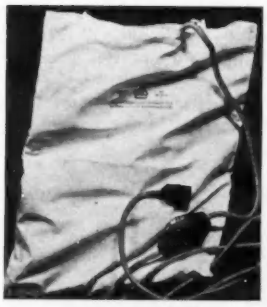
Messrs. Falk, Stadelmann's 76-W hot cushion is guaranteed to be non-inflammable and shock-proof; it is fitted with waterproof and washable covers and three-heat switch under thermostatic control. The Cooper-Stewart bed-warming pan is a flat polished metal disc, 8.5 in. in diameter with 400 W loading. The 20 W Waring bed warmer is tubular with a handle at one end through which the connector passes, 2 in. in diameter and 28in. long overall.



The Hanovia u.v. ray lamp

The 4-pint Premier bronchitis kettle is loaded to 650 W and is fitted with a safety cut-out. The lid, to which the 25-in. spout is fitted, is removable for cleaning. The filler allows water to be added without switching off the kettle and also acts as a water level indicator. The standard finish is polished copper. The Bulpitt 6-pint kettle has a large lid with a moulded filled cap; the 500-W element is protected by a capsule safety device.

The Green distiller is loaded to 200 W and costs 50s., its overall dimensions being 7.5 by 22 by 8.5 in. It has a removable lid to facilitate cleaning and two spouts through which the distilled water issues. It is automatic in action, switching itself on when water is poured in through the lip and off as soon as the water has been converted into steam.



"Auto Maid" heating pad

Among air purifiers and deodorisers the Ashton "Airphilta" is in the form of a totally enclosed ceiling pendant. Air is drawn into the apparatus and forced through a spray of water, which cools and cleans it before expelling it again. Fresh water has to be placed in the reservoir every few days. The loading is 40-W.

"Sterizair" pendants and floor standards contain an inverted motor driving a fan which draws air upward through a filter cloth, which is removable for cleaning. The fan shaft extension carries a device that lifts water from a pan in the base and sprays it on to the filter cloth, the freshened air being circulated without causing draughts. "Ozonair" generators are made in many forms and sizes from 5 W, including a table standard combined with a reading lamp or small fan.

An Electric Wash-boiler Works

EARLY in 1935 Messrs. Drake & Gorham Wholesale, Ltd., commenced to market their own electric wash-boilers and electric washing machines under the trade name of "Dragor," producing these at their wash-boiler works situated at Oxford Mill, Waterloo Road, Burnley. The works comprise an extensive block, which was formerly a cotton mill. The premises being central, with ample accommodation for extensions, have been suitably altered and equipped with up-to-date machines, also receiving and despatching facilities. Owing to the increasing demand for these boilers it has already been necessary to enlarge the accommodation. The "Dragor" wash-boilers are produced in these works entirely from the raw material which is machined, stamped, assembled, enamelled, electrically equipped, tested and dispatched. The whole work is carried out on one floor, thus enabling a constant flow of wash-boilers to follow in sequence through the various stages of production.

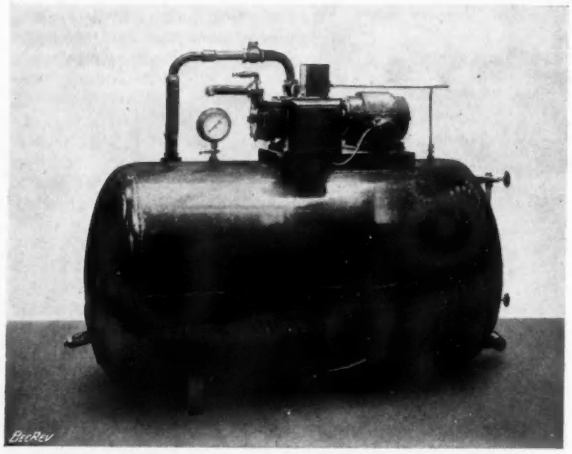
1. General view of the machine shop. 2. Heavy stamping machine with flanging machine at the rear. 3. Edging and hand-rolling machines. 4. Part of a consignment of boilers ready for dispatch.

A Diversity of Small Appliances

Equipment for the kitchen, bathroom and garage

There are many useful appliances for the home which cannot be classified under the foregoing sections. Many of them are real labour and trouble savers, while others may be described as "refinements" or luxuries.

AMONG the food-preparing appliances which are available is Messrs. L. G. Hawkins & Co.'s "Culinaire." This is neatly contrived and all enclosed, with a mincer, grinder, fruit-juice extractor, and similar devices easily detached from a vertical shaft driven by a motor in the base. The Gilbert



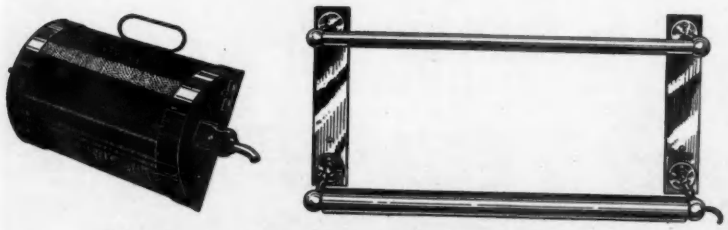
Rhodes automatic pressure-controlled pumping outfit

"Kitchen-etta," for similar uses, consists of a table stand on which is mounted a hinged motor fitted with double worm-gear drive and two vertical and two horizontal shaft outlets for attachments. With the Gilbert "Sunkist" fruit-juice extractor it is merely necessary to cut the fruit in half and press it down on to the rotating reamer in the bowl. Extra attachments are available.

The British National "Mixabeater" is a tilting table model, so standardised that additional attachments can be purchased separately. "Sunco" drink mixers consist of an agitator driven by a tiny vertical motor attached to a cover plate which fits over a glass or jug. Cooper-Stewart drink heaters of the 200-W immersion type are small enough to fit inside a glass. This company has a one-pint 400-W metal hot-water jug.

Messrs. Falk, Stadelmann's Doulton ware "Markeith-Servis" hot-water jug is designed for quick boiling. A 700- or 1,200-W element is in direct contact with the water, but no current can flow while the insulating lid is off. A safety fuse is provided which will blow if the jug is switched on without water. Electrically heated food trolleys are made by Messrs. A. Reyrolle & Co., Ltd., and Bertram Thomas; the latter also supply cylindrical plate warmers with revolving shutter and rotary switch.

The small "Sunco" "Handy freeze" enables ices and cold sweets to be made at home in about fifteen minutes. Self-adjusting wooden beaters in a pine tub are driven through enclosed gearing by a vertical motor incorporating a cooling fan. The Cooper-Stewart electric poultry scorcher is a nickel-



Waring car radiator heater (left) and electric towel rail

plated looped tube 12 in. long with a bakelite handle.

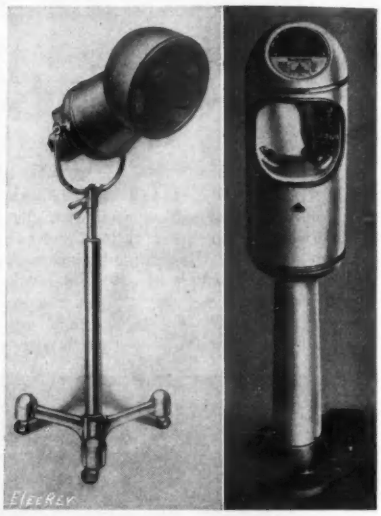
The "Tecal" outfit for tea making (Drake & Gorham Wholesale, Ltd.) is so devised that at any pre-set time the kettle will be switched on, and immediately the water boils sufficient is automatically emptied into a teapot for two cups of tea, the remainder being left in the kettle for shaving or other purposes. At the same time the kettle is automatically switched off, an a.c. alarm clock (which actuates the device) sounds, and a combined table lamp is switched on if desired. Messrs. Hawkins' "Teesmade" tray and cabinet outfits are supplied with a coloured china service, and a 2.5-pt. kettle with a 700-W immersion element.

Bathroom Equipment

The "Thermidair" convector is a bathroom heater, towel drier, and clothes airer combined in one portable unit. The enamelled sheet-metal base contains a gilled tube heater of 1 kW with three-heat control. Hot air issues through the perforated top to warm the room or dry towels hanging on chromium-plated rails. There are two models. The Sun Electrical Co. supplies a variety of bathroom heaters and airers in single- and multi-tubular patterns and in various colours.

Belling towel and airing rails are combined with a perforated 180-W tube for wall mounting or a 750-W protected heater with a rotary switch for floor mounting. The "Arora" towel horse is a portable floor heater weighing 11 lb., with provision for earthing the enamelled aluminium frame. British National and J.P. tubular rails for wall mounting have 125- and 200-W loadings and are finished in various colours. Messrs. Eastwoods' round and hexagonal tubular rails are of the hot-water pattern, so avoiding dry-element overheating and scorching.

The 75-W Grafton is a tubular airer for wall mounting. Tubular "Heatrae" rails are made for floor and wall mounting from 60 to 150 W, or combined with an air warmer of 400 W. There is also a 400-W conversion unit for hanging on to the lowest rail. Siemens "Xcel" wall-bracket heaters have a loading of 125 W and are finished in white enamel. The Waring double rail for wall mounting is loaded at only 30 W.



Calvete hair dryer (left) and Siemens-Schuckert hand dryer

Toilet Appliances

Among the newer hair dryers producing hot and cold air streams is the Bulpitt in a moulded bakelite case. The "Magnet" diffuser type has an extra large diameter aperture for the exit of heated air and a three-position switch; there are a 900-W 2.5 lb. size and a bakelite encased 650-W model and a table stand can be provided.

Messrs. I. Calvete's "Simplex" model has a reinforced fabric bakelite casing, the motor itself also being mounted in a bakelite frame. The "Ultra" hair-setting dryer delivers a large volume of air at low pressure and has a ball-bearing motor. The "Perfex" floor standard has a bakelite hood for fitting over the user's head.

Messrs. Cooper-Stewart's dryers include a bakelite model weighing 28 oz. with a mirror built into the case. Messrs. Hawkins' "Supreme" models are cased in coloured bakelite; an adjustable table stand and a scenting and deodorising attachment are extras. The W.R.C. "Syrene" is made entirely of bakelite with switches for the hot and cold air streams placed on the handle. This feature enables both switches to be manipulated by a finger of the hand holding the machine, leaving the other hand quite free. Similarly the Dulcetto-Polyphon dryer incorporates a one-hand-operated switch in the bakelite handle.

Coloured curling irons with 20-W loading and a 100-W cylindrical heater into which ordinary tongs can be slipped are

supplied by the Sun Electrical Co. British National 25-W curlers have a detachable swivel plug to prevent the connector twisting and also a slip-on comb for hastening hair drying. The coloured 20-W Westinghouse curlers supplied by Messrs. L. G. Hawkins are 9.75 in. long. Falk, Stadelmann's 150-W curling-tong heater is fitted with an earthing connector. Bakelite cased "Sunco-Burman" hair clippers incorporate a universal motor and switch in the handle and the Siemens-Schuckert "Sirama" electric safety razor has a tiny battery-driven motor encased in the handle.

Constable, Hart electrically controlled garage doors

The 200-lb. 0.5 pint "Sunco" and Siemens "Xcel" shaving pots have a ledge for supporting the brush. The "Sunco" hand dryer is intended for wall mounting. It has a foot-press switch and the 1,750-W elements are in the trunk; hot air issues in three jets from projecting arms between which the hands are held. The new Siemens-Schuckert hand-dryer is an improvement on the old "Protos" model, the chief advantage being greater speed of drying.

Household Fans

Marelli fabric-bladed "Nastrovent" fans can be had with an oscillatory movement controlled by a lever, which is a new departure. A speed controller is provided and the loading is 34 W. "Zephyr" fans are made by the Metallic Seamless Tube Co., which now also offers a new "Modern" four-bladed type with a wire guard mounted on a light tubular stand, the loading being 20 W. Grafton table models are coloured and adjustable for position, with a push-switch in the rubber footed base.

The Berkeley & Young "Pixie Boudoir" table fan can also be suspended from the ceiling; the 20-W motor, case and two blades are moulded in mottled colours. "Magnet" a.c. and d.c. fans of the table, wall bracket, and ceiling types are of the adjustable-fixed and oscillating patterns with black and white enamel standard finishes. All are fitted with speed regulators.

Automobile Accessories

The Klaxon "Comfortair" fan is designed for use inside a saloon motor car. Its four blades are 6.5 in. in diameter and protected by a wire cage. For keeping motor car engines warm in cold weather the "Sunco-Bray" heater is screwed into a container fitted with inlet and outlet pipes for connection in the engine's circulating system without impeding the flow of water. When not in use a water-tight flap fits over the plug entrance.

Messrs. Green's bottle-shaped 75-W engine heater has a hook for hanging inside the bonnet and a 60-W British National is tubular with a handle at one end through which the connector enters. The Bulpitt 100-W canister has a hook at one end and copper gauze vents in the sides. The "Arora" car heater is a flat slab type, 11 by 6 by 1.25 in. thick, weighing 2 lb.; it consumes 3 A at 12 V. There is also a tubular pattern for hanging on the engine radiator. The Berkeley & Young utility heater is of the flat ribbed slab pattern (800 W).

The cast aluminium anti-frost heater for hanging under the bonnet of a car made by Messrs. W. T. French & Co. has gauze-protected apertures after the style of a miner's lamp; its loading is 70 W and weight 1 lb.

Messrs. Hawkins's 100-W "Peter-the-Heater" is cylindrical and can be combined with an inspection lamp. The Siemens "Xcel" 100-W heater is a perforated canister, while the Waring pattern is semi-circular in section, enclosed in perforated metal and loaded to 50 W for mains connection or 30 W for 6/12-V battery use.

Constable, Hart's "Parlee" automatic garage opener is arranged to be actuated by a contact box let into the front path and depressed by one wheel of the vehicle when entering. The circuit thus completed operates the lock fastened above the doors. Simple re-setting mechanism is operated by a cord. A master switch is mounted inside the house with an additional push, which allows the garage doors to be opened from the house.

Small Power Motors

B.T.H. refrigerator motors are specially designed for domestic use, and are built to eliminate noise and maintain a high performance. They include d.c. repulsion-start induction, and capacitor types. The last-named is very simple, and the latest features are resilient mounting, which minimises electrical hum, in addition to a patented automatic belt tensioning device. The company also manufactures a large variety of universal motors, one type being used extensively for driving vacuum cleaners, others for hair dryers, fans, washing machines, window cleaners, mixing machines, pumps, and sewing machines.

Cook's small "Ace" power units consist of a 0.25-h.p. B.T.H. motor, split-phase for a.c. and compound wound for d.c., combined with a friction clutch. The driving belt pulley of the clutch is a bushed aluminium die casting and is automatically lubricated, oil splashing being prevented. Downward pressure on the footplate engages the clutch, and the pressure release disengages the clutch and brakes the loose pulley. The ¼ h.p. model may be fitted to any domestic treadle sewing machine.

B.T.H. capacitor motor with resilient mounting

G.E.C. fractional h.p. motors are made in many a.c., d.c., and universal sizes and types. One is small enough for drink mixers, and the sewing machine model consists of an a.c. 0.25 h.p. motor combined with a clutch fitted to the shaft extension, with a drum to which a brake is applied when the foot of the operator is removed from the treadle. The Hawkins sewing machine motor is rectangular in shape and is supplied with a foot pedal regulator and adjustable reflector lamp.

Rhodes, Brydon & Youatt self-priming pumps can be made fully automatic, motor driven and controlled by pressure switch, and self contained for domestic water supply systems. They can deal with cold and also hot vaporising liquids.

Dowsing's cigarette and cigar lighter is constructed of polished aluminium, and the base is covered with baize. A press switch is fitted, and the plug-in element is easily replaced. The Hawkins "Supreme" is cylindrical, with a switch in the handle and wall bracket. Messrs. Cooper-Stewart supply a bakelite table lighter.

Messrs. Hawkins's 350-W heater plate for use with a trousers press is of a convenient size for fitting into the leg of the garment. The Reid tie and trousers presser is a small tubular element attached to which are two broad blades; the trousers crease is placed between these and slowly moved up and down.

The illuminated "Attracta" house-name and number sign for hanging in the porch or over the front door is open at the bottom and has a reflector at the back.

"Attracta" illuminated house-name sign

The Burgess "Keelite" consists of a pocket key container combined with a small dry battery and miniature lamp bulb with a snap-switch for illuminating a door keyhole at night. A similarly devised screwdriver, which directs a beam of light on to the screw head, is also available.

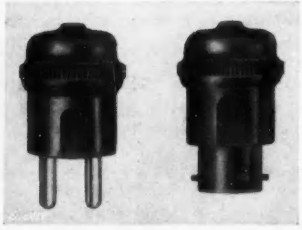
M

ACCESSORIES AND FITTINGS

Makers of accessories and fittings have been having a busy time lately both in improving existing manufactures and designing new products to meet the requirements of the many new appliances put on the market. Installation work is thereby considerably simplified in all its branches, and, on account of the intense competition, both appliance manufacturers and electrical contractors may be assured of getting whatever articles they need with the latest improvements and at reasonable prices.

TO-DAY'S intense competition in the wiring accessories field is responsible for by far the most of the new switches, plugs, lampholders, and what not which appear on the market, but, apart from that, B.S.I. requirements and I.E.E. Regulations do control to some extent technical developments.

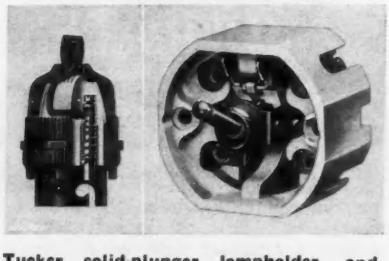
In our last year's Domestic Number we announced the introduction of the first three-pin plug and socket made to comply with B.S.S. No. 546 by M.K. Electric, Ltd. It had an approximately square base cover with a nearly triangular plug, and to-day this style is comparatively common. Now we announce another M.K. plug and socket, which also conforms to the requirements of the same Specification, but is also fitted with socket screens as recommended in the I.E.E. rules. The screen or shutter is operated by the insertion and withdrawal of the earth plug, and, because the screening feature prevents the live pins from being inserted singly, the overhang problem is solved without the necessity of the larger base of last year's unit.



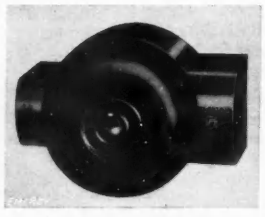
Ward & Goldstone convertible plug-adaptor

Along somewhat similar lines is the design of the plug and socket safety outlet just introduced by Messrs. Wm. Sanders & Co. (Wednesbury), Ltd. It is made in 2-, 5-, and 15-A sizes for both surface and recess mounting, and in the two larger models the pins are insulated for a distance from the plug body sufficient to ensure that it is impossible to make contact with the live metal with a blade-like article. The contacts are self-aligning, and a soft rubber ring affords a uniform cord grip all round the flexible cable. It has front-entry terminals.

The 2-A outlet movement has made big strides during the year. Messrs. J. A. Crabtree & Co., Ltd., have extended their range, which now embraces 2- and 3-pin flat-top and hand-shield plugs, surface flange, and flush sockets, and combined switch sockets in surface, skirting-board, and flush patterns. Two-A two-pin switch-plugs are now included in the popular competitive "Spartan" range of

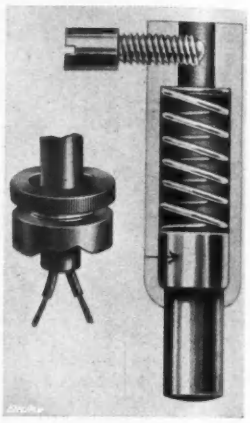


Tucker solid-plunger lampholder, and (right) Tucker heater switch



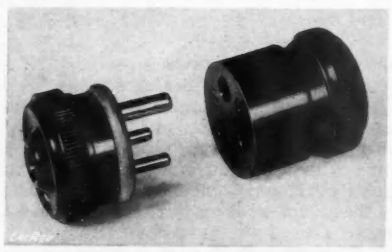
G.E.C. switch-plug with additional uncontrolled outlet

gear produced by Messrs. J. H. Tucker & Co., Ltd., and a two-A unit is included in the "Wylex All-In" equipment introduced by Messrs. George H. Scholes & Co., Ltd. The base of the latter incorporates 15-A and 2-A sockets, and there are three plugs—a 15-A dual plug and 5-A and 2-A fused plugs. Any of the plugs will fit the 15-A socket, and both the fused plugs will fit the socket portion of the dual plug, but only the 2-A plug will fit into the 2-A socket. The nine possible combinations of connections thus afforded render practically any room fully wired for normal requirements. This "Wylex" flat-pin plug, with its special switching feature, and the special interlocking switch-plugs, such as the H.B. unit produced by Messrs. Henley, Burrowes & Co., and the automatic Wandsworth switch-plug seem to thrive on their independence of specifications and regulations.



Iddon guided spring lampholder plunger and cord-grip for o.t.s. cable

Crabtree's have extended their range of compact switch-sockets, so that the 5-A pattern is now offered with a s.p. switch, although the makers stress the importance of using a d.p. unit for the control of portable apparatus. The dual-purpose switch-plug recently marketed by the General Electric Co., Ltd., has on one side a 5-A two-pin socket which is not controlled by the switch, so that an uninterrupted supply is available for a mains clock. On the other side a 15-A two-pin socket is controlled by the switch.



Lundberg 2-pin and earth extension connector

Plug-Adaptor Developments

For the smaller appliances there is a good deal of overlapping between the plug and the lampholder, and so there is a profitable field for such equipments as the "Presto" plug adaptor introduced by Messrs. Ward & Goldstone, Ltd. By a turn to the right a lampholder adaptor is available for service, while a turn to the left substitutes a 5-A two-pin plug for the adaptor. The unit is interchangeable with all standard 5-A two-pin sockets and b.c. lampholders, is easily wired, and has an efficient cord grip. This company and the G.E.C. have contributed towards the idea of ventilation of H.O. lampholders. The W. & G. units are distinguished by the long slots in the skirt, while there are a greater number of smaller

slots at the top of the skirt of the latest G.E.C. lampholder.

There is now a "Titan" (Tucker) lampholder in which the solid one-piece plungers and terminals are mounted in a separate interior of high-quality English vitreous porcelain. Further, all the "Titan" units have been improved by the addition of an external gripping flange integral with the body and having finger-tip projections. Similar projections on the underside of the shade ring facilitate manipulation within deep or narrow shades.

In addition to their lampholder cord-grip for braided flexibles, in which the single leads are divided by a porcelain cone, Messrs. Victor H. Iddon, Ltd., have now introduced a circular cord-grip for use in bathrooms where c.t.s. cable is used to comply with the Wiring Regulations. The grip is on the outer sheath, and pressure at the point of entry is eliminated. Another Iddon lampholder development is solid plungers with parallel springs which are maintained true within guides at any stage of compression or expansion. Scientific tempering of the springs is a feature, and the company maintains that it is more important to avoid side wobble than to be concerned over whether or not the springs carry part or none of the current. Two push-bar switch lampholders produced by the Wandsworth Electrical Manufacturing Co., Ltd., are examples of the rapid growth of this type of equipment. With and without skirts, these units have plain surfaces without sharp corners, and the bayonet slots are reinforced by metal inserts.

Crabtree extensive looping ceiling rose

Wandsworth ceiling switch

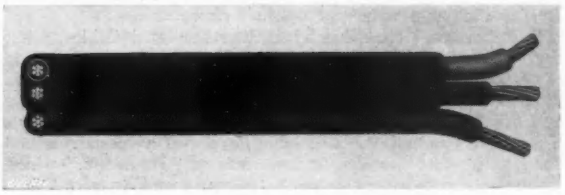
Importance of Lighting Accessories

The introduction of a new two- and three-plate ceiling rose with a moulded cover by Crabtree's is a further reminder that lighting accessories remain of outstanding importance in these days of plug-and-socket outlets and heat-resisting insulation. This rose has a moulded cover, is smaller, neater, and easier to erect and wire on both concealed and surface wiring systems. It is adaptable for use with or without a mounting block or chain carrier ring. The steatite interior has substantial terminals (one coloured for identification), and the wide holes permit extensive looping. The cord-grip is of the grooved ring type: the flexible is first passed through the centre and then each core is wound round the ring.

Many lighting-switch developments are in the direction of neatness, and a good example is the G.E.C. "Nipper" switch, with its rapid make and break, which has been utilised to obtain a very neat and inexpensive flush assembly. The one-way and two-way switches are supplied with plate fixing screws, and the one-gang and two-gang brown bakelite flush plates have pillars on the underside to provide a seating on the switch base. Hardwood boxes are available to complete the assembly. The new "London Junior" all-insulated underslung switch, produced by Messrs. A. P. Lundberg & Sons, Ltd., has a porcelain base and a bakelite knob and front. It is available in surface, semi-recessed, and flush models with captive screws in the cover and front. The blade contacts of the q. m. and b. movement, the one-piece double-leaf contact springs, and the substantial wiring terminals are other features.

"Ezilite" bed-switch conversion set

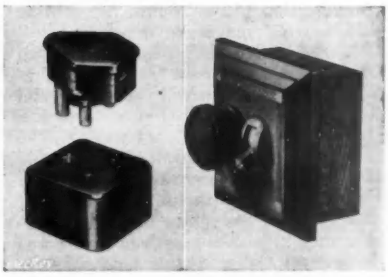
We do not propose to select switch plates for reference, for every make has its special distinction of finish. But a reference to the indicating plates produced by Patent Switch & Fuse Indicator Co., Ltd., is excusable. The small neon tube has a consumption of practically nil. The highest consumption figure shown in a report of tests of the indicator tubes, signed by Mr. W. H. N. James, Technical College, Bradford, is 0.96 mA per tube. The current was measured by determining the voltage across a non-inductive resistance placed in series with the tubes.



Glover "domestic" cable with continuous and separate earth core

The Ceiling Switch

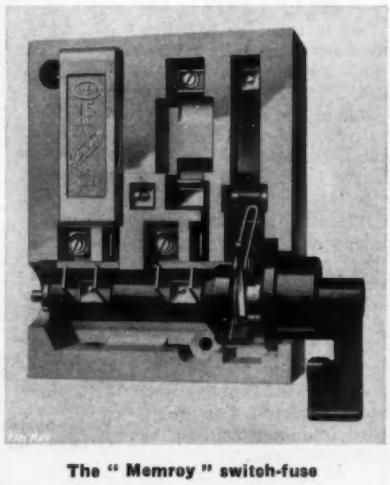
Another old friend with scope for increased service is the ceiling switch, and a new Wandsworth model in both surface and semi-recessed types is suitable for direct mounting on standard iron boxes. No special adaptor plates are required, and all patterns are suitable for vertical or horizontal mounting. An automatic earth is provided for by the strong fixing strap, and the robust soldered link chain has a turned metal cord connector. Bakelite break joint rings are available. The Tucker locked-cover switch is now available in insulated patterns with solid link or q.m. and q.b. movements. The switch-in-line idea has been responsible for a number of developments of late, and a good example is the "Speedy" d.p. unit for 10 A introduced lately by Lundberg's. The movement is totally enclosed in a black bakelite case, and both standard and earthing models are available. Each pattern has rubber ring cord grips, and the earthing unit has a suitable terminal for that purpose. There is also a panel model of the "Speedy" switch, which has well-shielded wiring terminals and a solid bakelite frame with fixing holes for No. 4 B.A. screws. Another Lundberg introduction is a 2-A two-pin and earth extension connector designed to B.S.I. requirements. Both plug and socket terminals are marked "earth," "live," and "neutral" in a clockwise direction, and overhang of the pins is not possible. The socket contacts are shielded, the shield being operated by the earthing pin.



M.K. "Besa" plug with shielded socket contacts and Crabtree 2-A flush switch-socket in teak case

The recently improved "Ezilite" bed-switch conversion set produced by T. M. C. Harwell (Sales), Ltd., is another means of promoting the extended use of electricity. It provides for controlling a light from two points where there is only one switch normally installed. It is easily fitted by removing the existing switch and substituting the special "Ezilite" tumbler switch, which incorporates the connections for two-way working in the body.

With the present-day encouragement to install three-pin plugs for portable apparatus, the use of 3-core cable is being extended, and Messrs. W. T. Glover & Co., Ltd., have made a special effort in this connection. It is a tough rubber-sheathed twin cable with a continuous and distinct earth wire of the same sectional area as that of the conductors. The earth wire, although continuous with is separated from



The "Memroy" switch-fuse

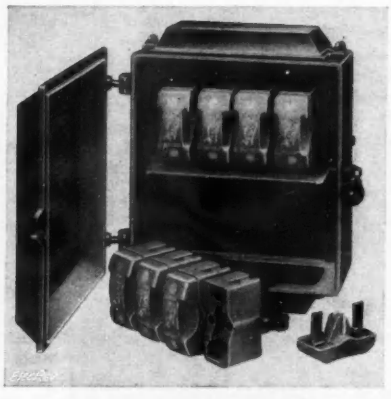
the insulated conductors. This company is also marketing a special flexible cable for domestic appliances. It is unkinkable, it will withstand rough use, the braid will not fray and it is available in twin and 3-core forms.

"Rockbestos," produced by British Insulated Cables, Ltd., for similar use, has its flexible strands served with a felting of asbestos which is black compounded, covered with two flexible varnished cambric tapes, served with a further felting and finished with a flame-proof wax. Messrs. W. T. Henley's Telegraph Works Co., Ltd., have developed a special method for laying up the conductor and cores of "Henleflex," which ensures a very high resistance to fracture resulting from "flexing." Further, absence of adhesion between cores and rubber filling makes stripping back easy.

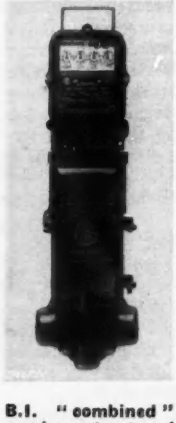
By means of a spring around the flexible, secured to the lampholder at one end and having a cord-grip fixing at the other end a few inches up the flexible, the flexible protector and anti-vibrator produced by Mr. Harold Ashton affords adequate protection at the vulnerable point.

Switch-fuses

Perhaps the biggest development in the accessories business of late has been in connection with combined switch and fuse equipment. A recent design of switch-fuse for lighting and heating mains is the "Invicta," produced by Messrs. S. Bill & Co., Ltd. The switch movement foundation is of vitreous china instead of the solid hydraulically compressed bakelite used in the company's "Q" switches. The movement is unchanged in design and the copper brushes are fitted by pressed clamps to a solid bakelite brush bar, and the fuses are of the "Botrade" arc-damping type. Ample room is allowed for cables, and wiring is rendered very easy. The "Memroy," the latest development of the Midland Electric Manufacturing Co., Ltd., is a 15-A, 250-V all-insulated combined switch and fuses suitable for service work or heater and cooker control. It has a very ingenious interlock between the cover and switch proper. Cables may be brought in from the top, bottom, or the back with equal ease and neatness, and the live terminals are deeply recessed and readily accessible for wiring. A captive nut suitable for sealing secures the cover.



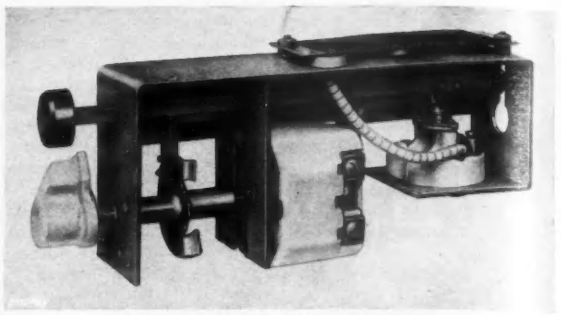
McGeoch ironclad fuseboard



B.I. "combined" service cut-out and meter

Closely allied to the normal switch-fuse is the "splitter" switch with fuses, and a typical development is the "Botrade" house service splitter for heating and lighting circuits. It comprises a fuse-board combined with a main switch and is made in two- and three-way models. The all-insulated "S.10" d.p. splitter switch-fuse supplied by the G.E.C. has a rapid m. and b. switch of the double-break drum type mounted in a solid vitreous porcelain base. "Minor" pattern "Quencharc" H.O. fuses are used, and the bakelite cover cannot be removed when the switch is in the "on" position.

As an example of the main-type distribution board with fuses only there is the H.O. "Warwick" unit produced by Messrs. William McGeoch & Co., Ltd. It is of 5- to 15-A capacity, and is available in d.p. and t.p. types, with from 2 to 15 ways. The fuses are specially constructed to ensure constant and efficient contact, and are arranged for easy wiring. On account of an inner projection on the bridge of the "Warwick" H.O. fuse the unit has a very long break. The contacts on the carrier are of h.c. copper and they permit easy wiring. Phosphor-bronze springs are fitted in the recess in the base to afford a constant pressure between the blade on the carrier and the terminal block. Tilting fuse banks is an excellent move towards easy wiring and ready accessibility, and an example is the iron-cased Crabtree unit in which the fuse banks are mounted on strong angle steel spot welded frames, which can be easily tilted or completely removed.



G.E.C. simmering device

Robust locking plates secure the fuse banks in position.

The Tucker "Slypon" range of fuse-boards for competitive installations now includes the "Slypon Cadet" pattern, with from 1 to 6 ways. The sliding detachable hinged front is again the feature, and there are also front-connecting branch and main terminals, and easy wiring H.O. type fuses. Akin to the distribution board is the service cut-out, and there is a tendency nowadays to produce these all-insulated. Reyrolle's have one with three distinct parts—the cable sealing box, a self-aligning fuse and a separately enclosed neutral link, all the insulating and enclosing parts being of moulded material. Access to the cable box is given by the removal of a cover fitting over the top part of the front. The fuse handle is withdrawable in the usual way, and the cover over the neutral link can be slid upwards.

In the G.E.C. all-insulated service cut-outs the fuse units are of the porcelain enclosed type with a bakelite cover secured by a spring clip. The terminals are suitable for looping and the fuse wire passes through an asbestos tube held in position by the spring contact tips on the holder. An unusual feature of the B.I. ironclad service cut-out is an arrangement by which the usual cable connections from fuse to meter are eliminated. A device in the upper part of the box forms a rigid structure and has readily adjustable connectors for attachment to the meter.

Domestic appliance switchgear wins a place under installation equipment if only because it is mainly produced by installation accessories manufacturers. Messrs. Tucker's 5- and 15-A s.p. and d.p. heater switches are now available with 12 s.p. wiring and 17 d.p. different wiring positions. The q. m. and b. movement has a complete positive action, and the edge of the porcelain shell of the switch body fits closely against the fire frame so as to make a totally enclosed switch unit. The call for a 5-position switch for 4-heat control of cooking has been further answered by Diamond H. Switches, Ltd., by the introduction of its 5-position flush cooker switches which afford a fourth heat for simmering. There is also an alternative type which has been designed for installation on existing or new apparatus fitted with two-section hot-plates only, in which

Water-heater thermostat (Thermostat Co.), thermostat for refrigerator control (Thermostat Co.), Rheostatic and Diamond H cooker units, and Rheostatic thermostat for room heating control

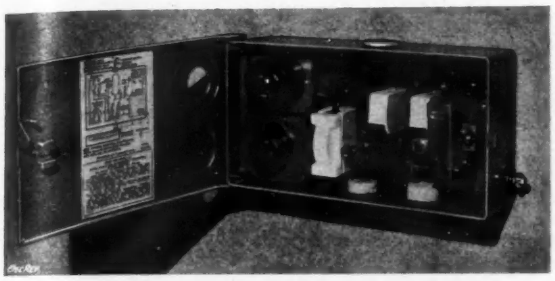
case the simmering position is obtained by an external resistance. A new 3-heat switch is so designed that at "low" 12½ per cent. instead of 25 per cent. of the load is provided. The same company has also recently introduced d.p. 3-heat series-parallel flush-mounted cooker switches in several designs and capacities.

Cooker Control

Then there are the cooker control units, which are a step nearer to the actual installation. "Ultraneat" (Tucker) control units are now available with a slow-break kettle switch for use on a.c. circuits. Recent experiments appear to have shown that the extended arc which occurs with a quick break is reduced to a mere pin-point spark when the circuit is broken by a slow-break switch. Reyrolle metal-clad control units each consist essentially of a d.p. double break q. m. and b. 30-A switch to control the main supply and a fuse-protected auxiliary circuit with a 5-A or a 15-A plug-and-socket outlet. The auxiliary circuit is separately controlled by a d.p. tumbler switch and may be used independently of the cooker for connecting a kettle.

A notable feature of a Crabtree control switch is the provision of a combined d.p. switch socket in place of the usual separate switch and socket. This is interconnected and has an additional safety feature. It can be supplied in the interlocking pattern. A "Botrade" equipment provides for plugging in a wash boiler or washing machine as well as a kettle.

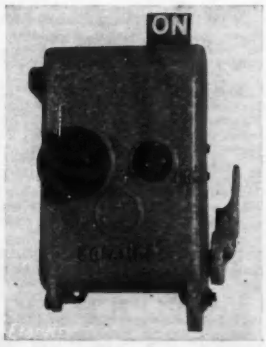
A simmering device introduced by the G.E.C. provides an external resistance for connecting in series with the hot-plate when the tumbler switch on the device is "open." This switch is so interlocked with the three-heat switch that the



Reyrolle earth leakage cooker control unit

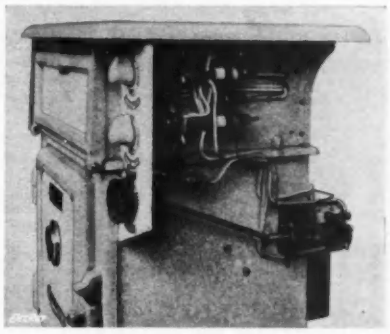
operating knob can be depressed to open the tumbler switch only when the three-heat switch is in the "low" position.

Whatever will be the decision of cooker manufacturers and the supply industry in respect of automatic cooker temperature control, it is evident that manufacturers of control equipment can meet any demands made upon them. The Rheostatic Co., Ltd., points to its "C.S." thermostat as its contribution to the present pioneering. The instrument is designed on similar lines to the company's immersion thermostat, and is essentially a very simple, sensitive and reliable device. Subject to its being correctly positioned in the oven it will give very close control of actual cooking conditions. It will operate on 15-A a.c. The Diamond "Diathermo" control apparatus, which is designed primarily for use on a.c., is also suitable for d.c. when fitted with a mercury switch. Accurate control from 250 to 550 deg. F. is afforded, and the sensitive life of all types of coils is estimated at 15 years. The improved instrument has been reduced by about 50 per cent. in size, and there has also been introduced a flexible drive shaft which enables the thermostat to be mounted out of reach, or where direct driving would be difficult. The "Thermentor" control unit of the Igranic Electric Co., Ltd., is operated by a strongly made metal thermal rod which responds closely to the temperature of the oven and switches the elements on and off in one or two steps. A signal lamp is incorporated and lights up immediately the correct oven temperature has been reached. There is no uncertainty about the development of automatic room temperature control within certain and extending limits. The new Rheostatic room thermostat is very attractive in appearance and is very sensitive. In any properly designed heating installation it will control to within ±½ deg. F., and it will handle currents up to 15-A a.c.



A Botrade cooker switch

The "A.C." thermostat is produced by British Thermostat Co., Ltd., particularly for space heating and designed for direct mounting in the room. The power element is a bi-metal strip in coil form mounted in a very light bakelite case which allows circulating air currents to flow freely round the sensitive element. The standard instrument is sensitive to temperature changes of ± 1 deg. F. The switch proper has a permanent magnet which ensures a snap action and provides a magnetic blow-out. Solid silver contact points are employed. Normally, temperature setting is provided for between 40 and 80 deg. F.



The Igranic "Thermentor" fitted to a Carron cooker

For water-heater control there is the "IT" thermostat, manufactured by the same company. The sensitive element projects from the rear of the case and is housed in a long stem for immersion. The bi-metal thermal element coil gives rotational movement to a shaft on which the switch arm is mounted, and the permanent magnet of the switch ensures a snap action. Standard temperature setting ranges, differential and stem lengths are 60/260 deg. F. and 200/400 deg. F., ± 4 deg. F., and 5 in., 12 in., 18 in. and 24 in., respectively.

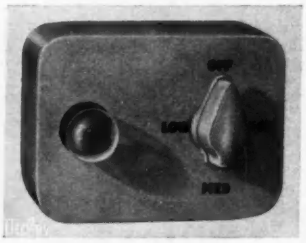
A new Rheostatic water-heater thermostat is also of stem construction, and is designed more particularly for incorporation in medium and small equipments. Its capacity is 8 A a.c., and it is very small and compact. The head carries a bold temperature scale with ready means for altering the temperature setting. A special feature of this is the unusually small head.

Arrow Electric Switches, Ltd., have just introduced a manual control unit for water heaters which is suitable in some cases for use in conjunction with a thermostat. A three-heat switch model would be used and in the medium- and low-heat positions the thermostat would be cut out, the water being maintained at the lower temperatures until "fast heat" should be required. It is made in 15- and 20-A sizes, and the following standard combinations of circuit control are provided for: three-heat, double-pole "on-off," and two-circuit "one-or-two-off." The switch is a reciprocating rotary Arrow unit which, with the b.c. lamp-holder for the pilot light, is mounted in a pressed steel case measuring 5 in. by 4 in. by 2½ in.

Sun-Vic Controls thermostatic vacuum switch

Another automatic control unit for water heaters, but for d.c. work also, is the new thermostat produced by Sun-Vic Controls, Ltd. It employs the company's vacuum switch and can be used on d.c. or a.c. without modification. Operation in vacuum is obtained by the expansion of a grid of fine wire and it is quite independent of position. The switch can therefore be mounted anywhere, and is not affected by vibration. A special application of this equipment, namely the load limiter recently introduced by the Metropolitan-Vickers Electrical Co., Ltd., is a combination of thermostat and vacuum switch designed to limit the load on domestic installations by cutting out the water heater or other continuous-load apparatus when the other domestic load exceeds a certain value. This is done by shunting a small fraction of the main load through a vacuum thermostat which accordingly heats up and at a pre-determined value of the load operates the vacuum switch and cuts out the water heater.

For refrigeration control there is the "Y.M." thermostat, made by the British Thermostat Co. It can be supplied with standard temperature setting scales 0-10/20 deg. F., 15/45 deg. F., and 45/75 deg. F., and the standard differential is 2 deg. F. The electrical circuit is interrupted by a switch mechanism of the magnetic quick-break type, and the whole mechanism is enclosed in a walnut bakelite case. For remote control the thermostat can be supplied with a capillary tube and a sensitive phial.



Arrow water-heater hand control unit

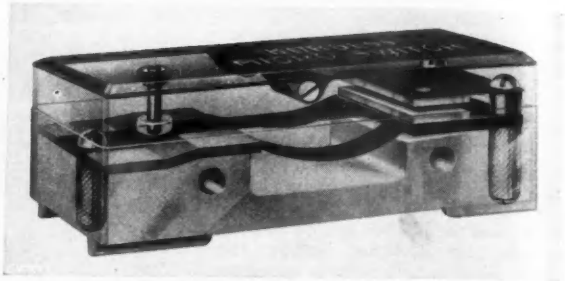
Similar load discrimination is effected by the "Reyvaux" (Reyrolle) off-peak load control unit. Its operation depends upon the use of an ingenious bi-metal relay which is capable of being set to trip at various current values. The relay is transformer operated and the apparatus also includes a d.p. or t.p. contactor mounted with the relay on a moulded base. The transformer primary is in series with one side of the normal load and the secondary is connected to the bi-metal strips. While the primary can carry up to 25 A, the secondary current cannot greatly exceed that which will operate the relay, so that a water heater can be automatically put into circuit when the normal house load is below any pre-determined value between 1 and 6 A, and automatically cut out when the normal load exceeds the selected value.

An earth leakage trip switch produced recently by this company is essentially a cooker control unit with a magnetic cut-out which trips on 3 mA leakage current, so as to overcome difficulties pertaining to low-resistance earths in rural areas.

Because of its very small movement and the slight pressure required for operation the "Micro" switch marketed by the Burgess Products Co. is suitable for use in connection with thermostatic control of heating equipment. It will safely make and break 5 A at 220 V, and its operation at high temperatures is practicable by reason of the phenolic compound body and cover and the beryllium copper construction. Such devices as clock movements will actuate the switch.

For rendering the use of hand lamps safe with mains supply the British Thomson-Houston Co., Ltd., has introduced the "safety-first" hand lamp transformer. It is fitted with a single fixing lug and should normally be hung on the wall close to the main supply point. It is supplied complete with a standard Crabtree socket and plug for connection to the flexible lead of the hand-lamp, and a special adaptor for use with a standard Lucas hand-lamp plug is also included. British General Manufacturing Co., Ltd., has introduced a bell transformer with a fuse in each pole of the secondary circuit. It also has an earthing screen between the primary and secondary coils and an earthing terminal.

A particularly notable change in the installation accessories industry is the rapidly increasing use of synthetic resin mouldings for switches, plugs, ceiling roses, lampholders, and so on. Such firms as Bakelite, Ltd., De La Rue & Co., Ltd.,



Burgess "Micro" switch

Ebonestos, Ltd., Moulded Products, Ltd., Birkbys, Ltd., and others are all playing an important part in this development by the supply of raw materials, and great credit is due to these companies for the manner in which they have produced insulation with the required electrical characteristics.

The Sun Electrical Co., Ltd., arranged the collection of accessories which forms the title block of this article.

Index to Manufacturers

Names and addresses' of firms mentioned in the foregoing articles

Aidas Electric, Ltd., St. Leonard's Rd., Willesden Junction, N.W.10.
Amplec., Ltd., Broad Oak Mill, Church St., Accrington.
Arora Co., Loughborough.
Arrow Electric Switches, Ltd., Newton Works, Tottenham Court Rd., W.1.
Artic Fuse & Electrical Mfg. Co., Ltd., Birtley, Co. Durham.
Ashton, H., Bull's Head Passage, Market Pl., Manchester.
Attracta Electrical Co., 2, Titchfield St., W.1.
Auto-Maid Vacuum Cleaner Co., 62, Blandford St., W.1.

Balcombe, A. J., Ltd., 52, Tabernacle St., E.C.2.
Bakelite, Ltd., 68, Victoria St., S.W.1.
Bastian & Allen, Ltd., 12, Church Rd., Hanwell, W.7.
Belling & Co., Bridge Works, Southbury Rd., Enfield.
Benham & Sons, Ltd., 66, Wigmore St., W.1.
Benjamin Electric, Ltd., Brantwood Works, Tariff Rd., Tottenham, N.17.
Berkeley & Young, Ltd., Tyseley, Birmingham.
Berry's Electric, Ltd., 85, Newman St., Oxford St., W.1.
Bertram Thomas, Worsley St., Hulme, Manchester, 15.
Best & Lloyd, Ltd., Handsworth, Birmingham.
Bill, S., & Co., Ltd., 146, Queen's Rd., Aston, Birmingham.
Birkby's, Ltd., Liversedge, Yorks.
Bray, Geo., & Co., Ltd., Leeds.
British Electric Domestic Appliances, Ltd., 3, Hanover Court, E.C.2.
British General Manfg. Co., Ltd., 2, Tyrwhitt Rd., Brockley, S.E.4.
British Insulated Cables, Prescot, Lancs.
British National Electrics, Mossend, Lanarkshire.
British Thermostat Co., Ltd., Teddington Works, Windmill Rd., Sunbury.
British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.
British Vacuum Cleaner & Engineering Co., Ltd., London, S.W.6.
Bulle Co., Ltd., 187, Tottenham Court Rd., W.1.
Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.
Burgess Products, Ltd., Barwell, Leicester.
Burnley Components, Ltd., Rose Grove, Burnley.

Calvete, I., Ltd., 59, North St., Clapham, S.W.4.
Carron Company, Carron, Falkirk.
Chance Brothers & Co., Ltd., Smethwick, Birmingham.
Constable, Hart & Co., Ltd., Broadway Bldgs., S.W.1.
Cook, J., & Sons, 126, Aldersgate St., E.C.1.
Cooper-Stewart Engineering Co., Ltd., 136, Long Acre, W.C.2.
Crabtree, J. A., & Co., Ltd., Lincoln Works, Walsall.

De La Rue & Co., Ltd., Telenduron Works, Shernhall St., Walthamstow.
Dernier & Hamlyn, Ltd., 23, Newman St., W.1.
Diamond H. Switches, Ltd., Gunnersbury Av., W.4.
Domestic Electrification, Ltd., 85, New Bond St., W.1.
Dowsing Radiant Heat Co., Ltd., Kangley Bridge Rd., S.E.26.
Drake & Gorham, Ltd., 36, Grosvenor Gdns., S.W.1.
Drake and Gorham Wholesale, Ltd., 77, Long Acre, W.C.2.
Dulcetto-Polyphon, Ltd., 2 and 3, Newman St., W.1.

Eastwoods, Ltd., 47, Belvedere Rd., London, S.E.1.
Ebonestos Insulators, Ltd., Rollins St., Canterbury Rd., S.E.15.
Edison Swan Electric Co., Ltd., 155, Charing Cross Rd., W.C.2.
Electric Art Shades (1928), Ltd., Feering Factory, Kelvedon.
Electrolux, Ltd., 153, Regent Street, W.1.
Electrona Electrical Products, Ltd., Friday St., Manchester.
Electroway Heaters, Ltd., Baxter Works, Loughborough.
English Electric Co., Ltd., Stafford.
Eureka Vacuum Cleaner Co., Ltd., 8, Fisher St., W.C.1.
Euston Manufacturing Co., Ltd., 17, Tavistock Sq., W.C.1.
Everett, Edgcumbe & Co., Ltd., Colindale Works, Hendon.

Falk, Stadelmann & Co., Ltd., 83, Farringdon Rd., E.C.1.
Falkirk Iron Co., Ltd., Falkirk.
Ferranti, Ltd., Hollinwood, Lancs.
French, W. T., & Co., Ltd., Mysto Works, Browning St., Birmingham.
Frigidaire, Ltd., Edgware Rd., N.W.9.

Galsworthy, Ltd., 16, Newman St., W.1.
General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.
Gent & Co., Ltd., Faraday Works, Leicester.
Geyser Mfg. Co. (1932), Ltd., 1, Goodwin St., Fonthill Rd., N.4.
Gilbert, A. C., & Co., 109, Kingsway, W.C.2.
Glover, W. T., & Co., Ltd., Trafford Park, Manchester.
Grafton Electric Co., 54, Grafton St., Tottenham Court Rd., W.1.
Green, Geo., & Co., "Gee-Gee" Works, Chapel Rd., S.E.27.

Hague & McKenzie, Sloan St., Parade, Birmingham.
Hanovia, Ltd., Slough.
Harcourts, Ltd., 21a, Newman St., Oxford St., W.1.
Hawkins, L. G., & Co., Ltd., 30, Drury Lane, W.C.2.
Heatrae, Ltd., St. George St., Norwich.
Henley, Burrowes & Co., Hudson Drive, Cotteridge, Birmingham.
Henley's (W. T.) Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.
H.M.V. Domestic Appliances, Ltd., 363, Oxford St., W.1.
Hoover, Ltd., Perivale, Middlesex.
Hotpoint Electric Appliance Co., Ltd., 24, Newman St., W.1.
Hurley Machine Co., Oxford St., W.1.

Iddon, V. H., Ltd., 27, Blackfriars St., Manchester.
Igranic Electric Co., Ltd., 147, Queen Victoria St. E.C.4.
International Refrigerator Co., Ltd., 169, Regent St., W.1.
Inventum Electrical Appliances, Ltd., North End Rd., Wembley Park.
Ismay Zeros, Ltd., Dagenham.

Jackson Boilers, Ltd., Vulcan Works, Shafton Lane, Holbeck, Leeds.
Jackson Electric Stove Co., Ltd., 143, Sloane St., S.W.1.
Johnson & Phillips, Ltd., Charlton, S.E.7.
J. P. Tubular Heater Co., Newarthill, Mossend, Lanarkshire.

Kelvinator, Ltd., 258, Gray's Inn Rd., W.C.1.
Klaxon, Ltd., 36, Blandford St., W.1.
Knightshades, Ltd., 36, Queensway, Ponders End.
Kubex, Ltd., Swan St., Preston.

Leda Electric, Ltd., Oldham Rd., Miles Platting, Manchester.
Lightfoot Refrigeration Co., Ltd., Bush House, W.C.2.
London Electric Appliances, Ltd., 62, Glengall Rd., S.E.15.
Lundberg, A. P., & Sons, Ltd., 477, Liverpool Rd., N.7.

McGeoch, William, & Co., Ltd., 46, Coventry Rd., Birmingham.
MacGregor & MacCullum, Ltd., Dominion House, Thames Rd., W.4.
Manor Electric Oven & Fire Co., Ltd., 175, Windsor House, Victoria St., S.W.1.
Marelli & Co., Ltd., 19 Garlick Hill, Queen Victoria St., E.C.4.
Marco Refrigerators (1929), Ltd., Manor Works, Streatham Vale, S.W.16.
Medical Supply Association, Ltd., 167, Gray's Inn Rd., W.C.1.

Metallic Seamless Tube Co., Ltd., Ludgate Hill, Birmingham.
Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.
Midland Electric Mfg. Co., Ltd., Barford St., Birmingham.
Midland Metal Die Castings, Ltd., Fort Works, Pellum St., Wolverhampton.
M.K. Electric, Ltd., Wakefield St., N.18.
Moffats, Ltd, India Mills, Blackburn.
Morris, A., & Co., 46, Commercial St., E.1.
Moseley, H. G., & Co., Ltd., Eddo Works, Hospital St., Birmingham.
Moulded Products, Ltd., Chester Rd., Tyburn, Birmingham.

Newmode Electrical Appliances, Ltd., 131, New Bond St., W.1.
Nobus, Geo., Ltd., 87, Cleveland St., Euston Rd., W.1.

Osler & Faraday, Ltd., 89, Newman St., Oxford St., W.1.
Ozonair, Ltd., Ozonair House, St. Leonard St., S.W.1.

Patent Switch & Fuse Indicator Co., Ltd., 59, Newall St., Bradford.
Phillips, A., Ltd., Excelsior Works, Eyre St., Birmingham.
Philips Lamps, Ltd., 145, Charing Cross Rd., W.C.2.
Premier Electric Heaters, Ltd., Keeley St., St. Andrew's Rd., Birmingham.
Pressed Steel Co. of Great Britain, Ltd., Cowley, Oxford.

Raytonic Heating Co., Ltd., Devonshire Works, High Rd., Chiswick.
Revo Electric Co., Ltd., Britannia Works, Tividale, Tipton, Staffs.
Reyrolle, A., & Co., Ltd., Hebburn-on-Tyne.
Rheostatic Co., Ltd., Slough, Bucks.
Rhodes, Brydon & Youatt, Ltd., Waterloo Rd., Stockport.

Sanders, Wm., & Co. (Wednesbury), Ltd., Falcon Electrical Works, Wednesbury.
Santon, Ltd., Somerton Works, Newport, Mon.
Scholes, Geo. H., & Co., Ltd., Blantyre St., Hulme, Manchester, 15.
Siemens Electric Lamps & Supplies, Ltd., 38, Upper Thames St., E.C.4.
Siemens-Schuckert (Great Britain), Ltd., 30, New Bridge St., E.C.4.
Simplex Electric Co., Ltd., 159, Great Charles St., Birmingham.
Sloan Electrical Co., Ltd., 8, Golden Lane, E.C.1.
Smith's English Clocks, Ltd., Cricklewood Works, N.W.2.
Space Heating Co., 46, Park Sq., Leeds, 1.
Sparton Refrigeration Co., 62, Oxford St., W.1.
Sterilizair, Ltd., 11, Queen Victoria St., E.W.1.
Sullivan, H. W., Ltd., Leo St., Peckham, S.E.15.
Sun Electrical Co., Ltd., 118, Charing Cross Rd., W.C.2.
Sun-Vic Controls, Ltd., 430-431, Bush House, Aldwych, W.C.2.
Synchronome Co., Ltd., 32, Clerkenwell Rd., E.C.1.

Thermal Syndicate, Ltd., Neptune Bank, Wallsend-on-Tyne.
Thermega, Ltd., 51, Victoria St., S.W.1.
Thermics, Ltd., 39, Little King St., Camden Town, N.W.1.
Thermidair, Bush House, W.C.2.
Thermovent, Ltd., 1039, Argyle St., Glasgow.
T.M.C. Harwell (Sales), Ltd., 233, Shaftesbury Av., W.C.2.
Tricity Cookers, Wellington House, Strand, W.C.2.
Tucker, J. H., & Co., Ltd., Kings Rd., Tyseley, Birmingham, 11.
Tyme, Ltd, 5, New Bond St., W.1.

Unity Heating, Ltd., Vincent House, Vincent Sq., S.W.1.

Vactric, Waterloo Rd, Cricklewood, N.W.2.
Venner Time Switches, Ltd., Kingston By-pass Rd., New Malden, Surrey.
Veritys, Ltd., Aston, Birmingham.

Walker Fender Co., Ltd., Sherborne St., Ladywood, Birmingham, 16.
Wandsworth Electrical Mfg. Co., Ltd., Kenyon St., Birmingham, 18.
Ward & Goldstone, Ltd., Frederick Rd., Pendleton, Salford, 6, Lancs.
Waring Tube & Heating Co., Ltd., 4, Star Rd., West Kensington, W.14.
Warmo Heating Co., 48, Mortimer St., W.1.
Welbeck Company, 94, Baker St., W.1.
W. R. C. Household Machines, Ltd., Cobbald Rd., Willesden, N.W.10.

Extensions at Isleworth

THE Heston and Isleworth Corporation's electricity undertaking is just thirty-one years old. Enlargements in 1910, 1914, and 1919 catered for normal growth until 1925, when the advent of large factories and an abnormal increase in local housing development necessitated a complete revision of methods.

Further extension of the generating plant having been vetoed by the Electricity Commissioners, the alternative of purchasing energy in bulk had to be resorted to. At the same time it became expedient to change over the system of distribution from d.c. to a.c. Part of the conversion scheme has been completed, and the remainder is being proceeded with.

Two years ago the administrative offices and showrooms were enlarged, demonstration rooms and more window display space being added, while the meter department was reconstructed and housed in larger premises. A hiring scheme was inaugurated in 1932, and to-day there is a total of approximately 20,000 pieces of apparatus of various kinds on hire, and about 4,000 cookers are connected to the mains, in addition to 2,000 wash-boilers.

The output for the year ending March next is expected to reach approximately 41 million kWh, representing an increase of 21 millions during the three years that Mr. S. H. Fowles has been engineer and manager of the undertaking. Similarly, the number of consumers has grown by 7,097 to 21,715, the total connections having reached 57,898 kW this year. In December, 1934, the maximum demand on the system totalled 10,848 kW, which was supplied partly in bulk and partly by the local generating station of 2,200-kW capacity, comprising four water-tube boilers serving two engine sets and one turbo-generator with two motor convertors and two rotary convertors.

Three-phase, 50-cycle a.c. is purchased in bulk from the Metropolitan Electric Supply Co., Ltd., through three step-down 20,000/11,000-V transformers, each of 3,000 kVA, their output being passed by way of a ring main to ten transformer and two mercury-rectifier sub-stations. Four more sub-stations are being provided, and an additional e.h.v. cable is being laid to feed them.

The New Plant

To meet this winter's load it has been necessary to install a fourth bulk-supply transformer. It is of the Hackbridge outdoor type, of 5,000-kVA capacity, 21/11-kV delta-star connected and fitted with on-load tap-changing equipment. The associated new 20-kV input switchgear is of Reyrolle make, of 500-A carrying and 250,000-kVA rupturing capacity. The new 11-kV output switchgear was supplied by the G.E.C.; it is of 400-A carrying and 150,000-kVA rupturing capacity. The main and control wiring, connecting up, and putting into operation of the new plant was undertaken by the Corporation's staff.

With growing dependence being placed upon energy obtained in bulk from a system that is interconnected with the national grid need has arisen for a stand-by source of supply. Incidentally, the provision of a stand-by source has resulted in the obtaining of certain pumping loads in connection with the important West Middlesex sewerage scheme now nearing completion.

Accordingly a large battery of lead-acid accumulators has been installed, which, at the same time, will serve the useful purpose of lowering the maximum demand made for supply in bulk at times of peak load, so reducing the price paid for purchased energy. The battery is of Chloride make and of 5,000-Ah capacity at the standard ten-hour rate of discharge. The 280 cells are in series and tapped at the central point for three-wire working in emergency.

The cells are mounted on special oil-filled glass supports, which are mounted on a wooden framework. This, in turn, stands on porcelain insulators on acid-proof blocks embedded in the concrete floor, which is covered with bitumen compound and provided with draining channels to a sump. The weight of the battery is 293 tons, of which 160 tons is the weight of the lead. The 14,280 plates are immersed in 15,000 gallons of sulphuric acid in lead-lined wood containers.

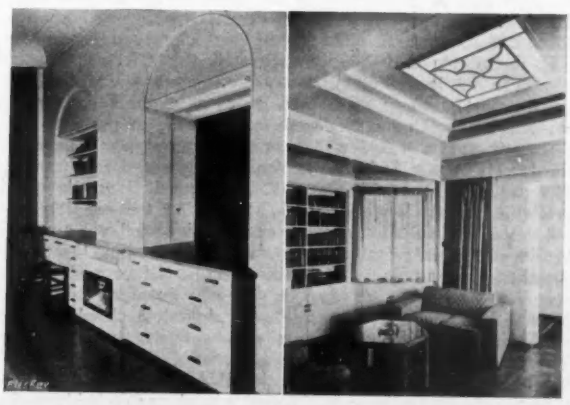
The switchgear, transformer, and battery booster set were manufactured and installed by the Electric Construction Co., Ltd., the main e.h.v. control cubicle being of G.E.C. make.

The supply is taken from the main station three-phase, 50-cycle bus-bars through a delta-star connected 11,000/400-V step-down transformer of 600-kVA capacity. It is then passed through tap-starting equipment to the booster set, which consists of a 273-h.p. salient-pole synchronous motor with a separate exciter driving a d.c. generator at 600 r.p.m. to provide an output of up to 2,000 A at 290 V. This generator is connected in series with the battery to the main d.c. bus-bars of the station, and is used for regulating the voltage for charging and discharging the battery.

The driving motor of the booster set may also be used as a synchronous condenser, and accordingly has been designed to furnish the equivalent of 500 kVA at zero leading power factor for correcting the p.f. of the main a.c. system.

The new equipment was officially inaugurated on October 5th. Councillor J. Woulfe, chairman of the Electricity Committee, who presided, explained the reasons for the additional plant.

Mr. J. Macfarlane Kennedy, Electricity Commissioner and President of the I.E.E., then performed the inauguration by switching in the new transformer and starting the booster set. A vote of thanks was proposed by Coun. C. L. Lewis, Mayor of Heston and Isleworth, seconded by Coun. S. B. Wills, vice-chairman of the Electricity Committee.



Two ultra-modern apartments illuminated with built-in lights by G.V.D. Illuminators, Ltd.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Christmas is Coming

Now that Christmas is approaching I would like to suggest to all those engaged in the electrical industry that when choosing presents they should consider giving something electrical. The choice of really beautiful and useful electrical goods is enormous nowadays, so that there is no excuse for anyone in the industry going outside when looking round for a gift, and, of course, it should be borne in mind that the more watts the gift consumes the better.

Manufacturers and traders would benefit, but what is perhaps more important, the supply side would get quite a boost, as many people would be introduced to the uses of electricity who otherwise might not consider it. I would suggest, further, that the Electrical Development Association could do a lot of useful work in this direction by means of propaganda and advertising between now and Christmas. By extensive advertising in the trade journals and circularising the many associations and societies I have no doubt the idea would be brought to the notice of many who might not think of it.

W. S. T.

October 7th.

Illumination Values

While there is every need for investigation into the correct values of illumination for varying processes, some of the arguments put forward by Mr. T. N. Riley, in your issue of October 4th, in favour of low values do not appear to be based upon fact. Mr. Riley suggests that brilliancies of 70 to 150 foot-candles give good perception of detail for a short time, but would prove extremely trying if the eye were exposed to them for long periods. If that is so, why do we not feel eye fatigue on a sunless summer day when we are able to work in illumination far greater than that mentioned? The statement that such illumination is difficult to obtain without objectionable glare is surely incorrect in view of the modern equipment now available.

At the time of writing there is a heavy rainstorm in progress and I feel inclined to switch on the electric light, yet on test I find that there is still 30 f.c. of daylight. Instead of feeling that it is insufficient, I should, according to Mr. Riley, find that now at last I am beginning to feel comfortable. That is far from being the case.

Those who are engaged in factory lighting know that, among others, tool makers almost invariably demand local or supplementary lighting, which is their way of asking for high values of illumination. They rightly contend that they cannot see properly with general lighting, even when this is of the order of 10 to 15 f.c. Supplementary lighting points give nearer 100 to 150 f.c., from which one gathers that they can see better and are more comfortable as a result.

Heat given off by the lamps might be very useful in reducing the amount of energy required for warming by other methods in winter when the lighting is chiefly used, and when every bit of extra warmth is very acceptable. The gas industry uses this as a sales argument in favour of gas lighting.

Surely we must think clearly in investigating this matter, and be prepared to use high values of illumination where close work is being done, but also be prepared to accept subdued lighting for our leisure hours when no work is being done.

A layman after reading Mr. Riley's article might easily gain the impression that, after all, all is well in those of our factories where old-fashioned conical shades are still to be seen, used on the hit-or-miss principle of giving very uneven illumination and only very low values. Clearly it is the duty of the electrical industry to be constantly checking this erroneous impression.

P. S. BARTON.

Potters Bar, *October 5th.*

Electric Ploughing

I would point out that there is apparently an error in the figures quoted in Column 2 by Mr. E. D. Davies in his article on "Electric Ploughing" in your issue of September 27th. Ploughing speeds of 120 and 80 metres per second are quoted. The former is approaching the world's land record, since 26.8 metres (88 feet) per second is equivalent to 60 miles per hour.

Working on these figures and the tractive force given, the horse-power at the plough cable is approximately 3,600 in each case, with a low speed peak load of 4,200. If we divide by 100 the power corresponds reasonably with the motor rating of 45 h.p., so that it would appear that the ploughing speeds should be 1.20 and 0.80 metres per second or 120 and 80 centimetres per second.

The maximum speed then becomes 2.7 miles per hour, which appears somewhat low for the actual plough travel with mechanical haulage, though this is offset by running several furrows together and the greater depth to which they can be cut.

Alternatively, the figures may be 120 and 80 metres per minute, although on the tractive effort given the motor would then be overloaded.

A. L.

October 3rd.

[Mr. W. Pritchard has also written to point out the discrepancy. Mr. Davies informs us that the ploughing speeds are 1.2 and 0.8 metres per sec.—EDS. ELEC. REV.]

The Lighting of Foundries

FOR purposes of comparison 2 ft.-candles were suggested as an arbitrary minimum for effective foundry floor lighting in a paper by Mr. R. W. Daniel (H.M. Inspector of Factories) which was read before the London Branch of the Institute of British Foundrymen on October 2nd.

The author said that foundries were inevitably dust- and dirt-creating places; such conditions united with the naturally dark colours of material and plant in common use detracted from whatever light was available. It must be borne in mind that the light was fixed and could not be moved to eliminate shadows cast by projections in the depth of the moulds, etc. The general lighting of many modern factories was between 10 and 20 ft.-candles, sometimes more.

In the winter of 1932-33 approximately thirty factories were visited in one large industrial city, during hours of darkness, and in most of them photometric readings of the actual light available at working points were taken. Only 29 per cent. of them possessed the modest 2 ft-candles or more generally over the foundry floor; and only 10 per cent. exceeded an average of 5 ft.-candles. In 52 per cent. less than 1 ft.-candle was available, and in 23 per cent. less than half a foot-candle provided the sole aid to sight. Those conditions did not appear to differ materially from those commonly prevailing throughout the country. Thus, a uniform and sufficient system of general lighting was an absolute necessity in every foundry. In addition to augmenting the general system, local points would be required for fettling, abrasive wheels, the machines in the fitting and pattern shops, and possibly the coremakers' bench, adequately screened and adjustable where possible. The reflection factor in the case of foundry sand was probably well under 5 per cent., and the absence of contrast in colours had a considerable bearing on the intensity of illumination.

For the observation of work in three dimensions, such as examining castings or cores, or in wood carving in pattern making, a degree of shadow might be found very desirable, and might be artificially induced. But for normal and flat work in general over the foundry floor it was best eliminated. The use of electric-discharge lamps, particularly of the mercury-vapour type, was increasing in many large foundries.

Of 500 factories recently observed, less than 10 per cent. were equipped with suitable modern fittings. In most of the remainder obsolete shallow conical reflectors were still in use, yet many were of quite recent installation. Recent photometric readings in a steel rolling mill showed that the floor illumination was increased from 4 to 6 ft.-candles intensity by the introduction of 150-W modern industrial units in place of the original 300-W points in shallow dirty obsolete fittings, and 50 per cent. improved illumination for 50 per cent. less consumption resulted.

Dust and dirt might reduce the available illumination by half within a few weeks of installation and, since the dimming effect was gradual, it usually passed unnoticed.

The Discussion.

Opening the ensuing discussion Dr. A. B. Everest said he believed it had been generally accepted that the old mercury-arc lamps gave the workers a headache in time, and he asked if any such physical effect was noticeable when electric-discharge lamps were used.

Mr. J. S. Dow (secretary, Illuminating Engineering Society) considered that 2 ft.-candles were far too little for foundry work. A committee working under the Department of Scientific and Industrial Research had been studying the relationship between illumination and quality of work in many

industries, and had found that, even in an operation which was almost purely mechanical (tile pressing), if the illumination were less than 3 ft.-candles the output and the quality suffered.

Mr. J. G. Clark (British Commercial Gas Association) said that lighting cost represented a very small percentage of the total works costs. Mr. Ackerley (General Electric Co., Ltd.) said it had been proved that by using properly placed lamps and proper reflectors one could secure better output by night than by day. Except in special circumstances, general lighting was preferable to local lighting. With high-pressure mercury light one could see every flaw in a mould far more clearly, probably because moulding sand reflected the blue end of the spectrum better than it did red rays. The high-pressure mercury lamp produced no ultra-violet or harmful light at all.

There had been one or two complaints about headaches, due to the tendency of the workmen, who were interested in the lighting, to stare at the lamps.

Mr. Daniel briefly replied to the discussion.

The E.P.E.A. Dinner

STRICT accuracy would require us to refer to the chief annual function of the Electrical Power Engineers' Association as the dinner given by the Southern Division to the members of the National Executive Council. To call so happy a gathering by so cumbrous a title would, however, be pedantic, and the name by which it is commonly known, "the E.P.E.A. dinner," is certainly more appropriate. The seventeenth of the series (in the twenty-two years of the Association's life), which was held last Saturday at the Holborn Restaurant, well maintained the high standard of its predecessors.

The chairman (Mr. E. Laming) welcoming the guests, referred to the apparent loss sustained by the Association through the resignation of the president-elect, Mr. E. Jones, owing to his appointment as city electrical engineer at Cardiff. Touching upon the new edition of the salaries schedule, he said that while some (such as himself) would not immediately benefit by its application, all would indirectly profit by the raising of the standard. (This we have heard described as "transformer effect.")

The toast of "The Association" was proposed by Mr. C. G. Morley New (Electricity Commissioner), who, speaking from his experience of thirty-five years of electricity supply, said that it was difficult for many to realise the conditions before the formation of the E.P.E.A. He congratulated the Association on its persistence in pursuit of its main object of securing the status and remuneration of its members without disturbing the industry and on its successful efforts to improve their qualifications through technical groups and its correspondence course. Recently he had noticed an advertisement by a supply undertaking in which membership of the Association as well as of the I.E.E. was mentioned.

The President (Mr. C. Cooper) responding, showed that except for the original "Stoker Award 9281," all the salary schedules of which there were four editions, including the "Supplementary Schedule, 1935," had been negotiated through the National Joint Board. The voluntary character of the Board was its strength, but at the same time it introduced a weakness in that a few undertakings still stood out. Some of these did so because the staff conditions were as good as those of the Schedule, and he appealed to these to come in and help with the good work.

"The Electricity Supply Industry" was proposed by Ald. J. Chuter Ede (chairman, London J.E.A.), who expressed the view that the Association was improving the working conditions of everyone in the country. He was glad that the Minister of Transport had adopted the suggestions made by Mr. E. E. Hoadley at Bournemouth that a committee should be set up to investigate the organisation of distribution. Response was made by Mr. A. E. McKenzie (chief electrical engineer, Wimbledon), who said that the electrical industry was now the second most important in the country, giving employment to 250,000 persons. With the completion of the grid there were now almost unrestricted opportunities for development. The number of consumers connected in 1933-34 was 681,000, and about 54 per cent. of the houses in the country received a supply, but the sale of domestic appliances was not keeping pace with these increases. In one undertaking, however, 99.4 per cent. of 35,000 houses were electrified, and every fifth house had both a cooker and water heater; in the first six months of this year its output had increased by 26 per cent. for all classes of consumers.

The use of electricity for motive power he regarded as unsatisfactory; only 35 per cent. of industry was electrified in 1930, and to-day it was less than 50 per cent. It had been suggested that the number of undertakings should be reduced by merging those selling less than from five to ten million kWh per annum, but there should be no difficulty (indeed a moral obligation was involved) in absorbing the employés, as no undertaking had reached saturation. The Association should, he considered, undertake the training of technical salesmen.

A presentation to the past president, Mr. R. H. Toynbee, and Mrs. Toynbee, in the form of a tantalus and glasses and a silver cigarette case, was made by Mr. J. F. Sarvent (senior vice-president), and an illuminated address was handed to Mr. E. Jones by Mr. H. J. Cox (junior vice-president). The thanks of all present to the committee which had organised the function was voiced by the chairman. This was a committee of one, Mr. F. H. Smethurst (hon. sec. Southern Division), and this is the fifth occasion for which he has been responsible, the number present being greater on each occasion, reaching about 540 this year. This is as it should be since the membership of the Association is also steadily growing. In 1928 it was 4,289, and in 1935 it was 5,128, the advance for 1934 being the best in any year during the period with 247. This year up to the end of August there had been 175 new members. The subsequent reunion and dance continued until midnight.

At Last Saturday's E.P.E.A. Dinner

Top: Mr. G. E. Love and members of the Association's staff. Left, standing: Messrs. H. J. Hadrill, C. Tritton, G. W. Essex and A. Parkinson; seated: Messrs. A. Harmon Jones, E. Jones, W. J. Oswald, W. Arthur Jones (general secretary), and J. C. Jones. Right, standing: Messrs. J. W. Thomas, J. F. Wallace, P. W. Cole, F. H. Smethurst and M. H. Roberts; seated: Mrs. Cole and Mr. W. Cornet

Connecting Bolton to the Grid

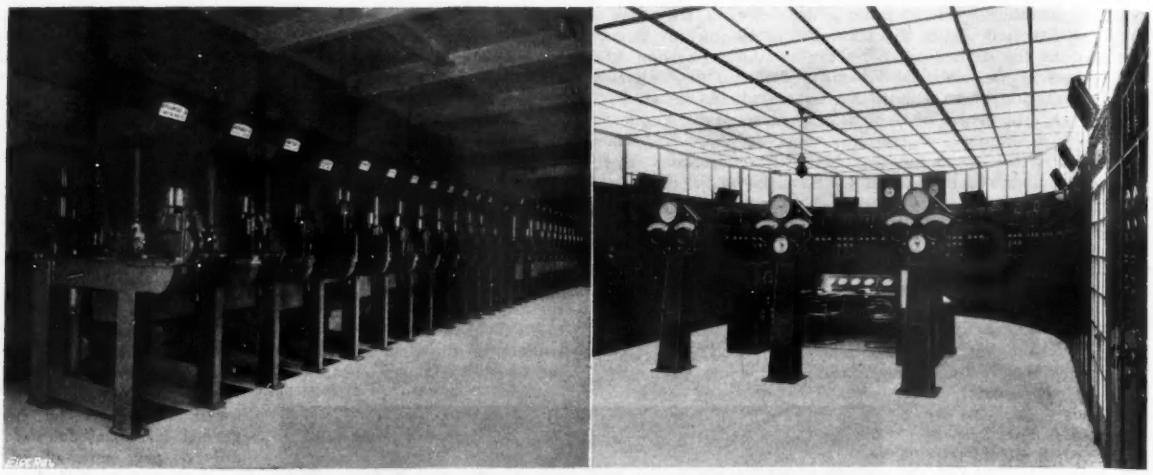
BACK o' th' Bank generating station of Bolton Corporation, which has an installed capacity of 46,500 kW with steam conditions of 225 lb. per sq. in and 600 deg. F., is a selected station into which the 132-kV grid lines between Kearsley (L.E.P. Co.) and Whitebirk (Blackburn) stations are looped *via* the sub-station of the Central Electricity Board which contains two 20,000-kVA transformers.

To meet these conditions 6.6-kV switchgear of greater rupturing capacity than that of the old stone-cubicle type has been installed. The new switchgear building, which was officially inaugurated on Wednesday, is a four-storey, steel-framed brick structure connected to the original switch-house by a covered gangway and by cable ducts. The switchgear floor is in three sections, and the circuit-breakers are in two parallel banks, back to back separated by a fireproof chamber containing the multi-core operating cables to the control room.

The first group of circuit-breakers comprises seven 750,000-kVA, 3,000-A, remote electrically operated units, connected to a single set of bus-bars. Two, the property of the C.E.B., control its transformers, one is a section switch, and the other four control the supply to the station through 25,000-kVA reactors and other main switch groups. The second group consists of thirty metal-clad 350,000 kVA units of different current ratings, also remote electrically operated. One set of the duplicate bus-bars is continuous, the other being divided into three sections to each of which are connected a generator, a reactor and outgoing feeders. Two units control works feeders and one the supply to old switchgear; three are bus-bar couplers.

The control room is situated on the top floor of the building. It contains the boards for controlling the main switchgear, old and new, and the 132-kV side of the Board's transformers, and also the equipment for metering the interchange of power with the grid. On the panels are mounted miniature instruments and control switches, and above is a mimic diagram indicating by coloured symbols, which are illuminated by concealed lamps, the state of the e.h.v. connections in the station.

The main switchgear reactors and control boards were supplied by the Metropolitan-Vickers Electrical Co., Ltd., the scheme being worked out in consultation with Mr. H. E. Annett, the borough electrical engineer and manager, and his staff. The installation involved considerable recabling by the department, to whose order cables were supplied by British Insulated Cables, Ltd., cable ducts by the Key Engineering Co., Ltd., cranes by Herbert Morris, Ltd., fireproof roller-shutter doors by Mather & Platt, Ltd., and an electric passenger lift by Wm. Wadsworth & Sons, Ltd.



Metropolitan-Vickers 6.6-kV duplicate bus-bar metal-clad switchgear and (right) the new control room at the Back o' th' Bank station, Bolton

During the past ten years the kWh sold in Bolton has increased by 56 per cent. to nearly 75 million, and the m.d. by 51 per cent. to 32,360 kW. The number of consumers, which in 1925 was 10,257, is now 29,510, representing an increase in kW connected of from 51,000 to 118,000, and involving the laying of 370 miles of supply mains, which now total 670 miles. The average price charged is 1d., or 0.26d. less than in 1925, since when the number of domestic appliances connected to the Corporation's system has increased from less than 6,000 to over 35,000.

Italy's Electrical Trade

FIVE years ago our exports of electrical goods and apparatus (as distinct from electrical machinery) to Italy totalled over £500,000 sterling in value. In 1931 they fell below £200,000 and in 1933 were only £166,000. The leading items making up this total in 1933 were radio apparatus (unspecified, but excluding valves), £13,000; telephone and telegraph apparatus other than radio, £40,000; and sundry electrical goods and apparatus, £71,000. Great Britain's exports of electrical machinery to Italy diminished in value from £37,600 in 1929 to £8,207 in 1933.

Italy's imports of electrical material of all kinds seem likely to dwindle because, in spite of the large amount of plant and accessories needed in connection with the many electrification schemes that have been developed in the country, Italian manufacture of material of various kinds has greatly expanded. Her imports of generators from all destinations, which were valued at over 23,000,000 lire in 1932, fell to 20,500,000 lire in 1934, those of transformers from 3,370,000 lire to 2,360,000 lire, and those of accumulators from 950,000 lire to only 396,000 lire. Insulator imports were halved in value during the same period; those of cable and wire fell substantially, except for some of the smaller sizes.

At the same time there is still imported a quantity of unspecified electrical apparatus, which in 1934 amounted to 10,163 quintals in weight and 35,050,000 lire in value, or rather more than in 1933 and about the same as in 1932. Of this total of 10,163 quintals, Great Britain supplied 1,041 quintals, Germany 5,907 quintals, and the United States 1,384 quintals, all approximately the same as in the two preceding years. While imports in the electrical machinery group have declined as a whole, so also have exports, and on balance Italy is still an importer. At the same time her total exports of cable and wire are much greater in value than her imports. Exports of the principal classes were as follows (value in thousands of lire):—

	1932.	1933.	1934.
Generators	27,700	14,100	13,900
Transformers	12,100	1,600	570
Accumulators	1,860	915	670
Electrical apparatus, unspecified ...	24,400	12,300	8,800
Cable and wire	7,700	4,500	5,400

The decline in machinery exports is attributable largely to the falling-off in shipments to Soviet Russia.

The manufacture of radio apparatus in Italy has now developed sufficiently not only to supply the home market but also to provide a margin for export. Milan and Turin are the principal manufacturing centres and the value of the annual output is given as about 120 million lire, chiefly complete receiving sets. Makers have recently been devoting especial attention to improving their designs with a view to reducing the size of their sets.

Exports of radio apparatus have varied in value between two and three million lire in recent years, nearly 13 per cent. consisting of five-valve receiving sets; 19 per cent. of sets classified as "other"; 22 per cent. of hot-cathode valves and rectifiers; 23 per cent. of spare parts for receivers, and the remainder of transmitting apparatus. The principal markets, besides Libya, are Switzerland, Tunis, Egypt, Turkey, Palestine, Albania and Argentina.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Sir Felix Pole's Appeal

In an appeal that is being circulated on behalf of the funds of the Electrical Industries Benevolent Association, Sir Felix Pole, the president, points out that the electrical industry is one of the largest in the country, employing directly or indirectly one million people. He appeals for increased support for the Association and for a determined effort to be made to augment the funds so that it may be in a position to deal more generously with the needs that are constantly arising. He refers to the new campaign which the Executive Committee now has in hand for increasing the membership and extending activities, a movement which naturally involves increased financial liabilities. Part of this movement consists of the widening of the scope of the appeal. The proposal that shareholders in electrical companies should be approached is now being acted upon, and many members of the benevolent public will also be enlightened concerning the existence and objects of the organisation.

We learn that the chairman of the Executive, Mr. E. E. Sharp, has recently spent several days in the Liverpool area, during which he has been busily engaged in connection with Association interests, and Mr. Seabrook, the Executive officer, informs us that Mr. P. J. Robinson, city electrical engineer of Liverpool, has accepted the presidency of a new Regional Area, with Mr. Ridout as honcrary secretary, and a committee is being formed.

Ironmongers as Electrical Traders

At a meeting of the Electrical Section of the Ironmongers' Federated Association on September 18th (reported in the *Ironmonger*) the hon. secretary, Mr. E. B. Holloway, outlined the negotiations of the Section with the National Electrical Contractors' Trading Association (an allied body of the E.C.A.). He said that the secretary of the N.E.C.T.A. had stated that the affiliation of the Ironmongers' Association would necessitate an alteration in the articles of association, and he suggested a further conference between the representatives of the two Associations. Mr. P. L. Heap, a member of the committee of the Section, said that the three main points involved were: (1) Whether the Section could function with N.E.C.T.A. as a retail section, as distinct from a contracting section; (2) on what terms; and (3) what voting power ironmongers would have. It was decided that the N.E.C.T.A. should be approached again and that a further effort should be made to secure direct representation on the Fair Trading Council.

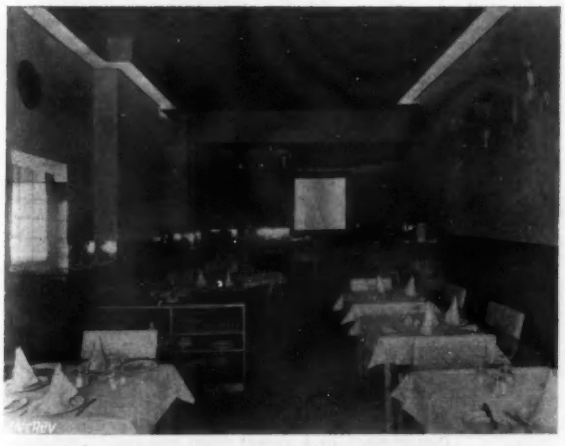
At the same meeting the Electrical Section approved a hire-purchase scheme for the sale of electrical appliances by members.

The Public Works Exhibition

Over three hundred firms will take part in the Public Works, Roads and Transport Exhibition, which is to be held at the Royal Agricultural Hall, London, from November 18th to 23rd. Street lighting and traffic signals will be strongly represented.

Lighting a Chelsea Restaurant

Continuous trough lighting round the borders of the ceiling is the eminently suitable means of illumination chosen for the



The dining-room at the Good Intent Restaurant, Chelsea

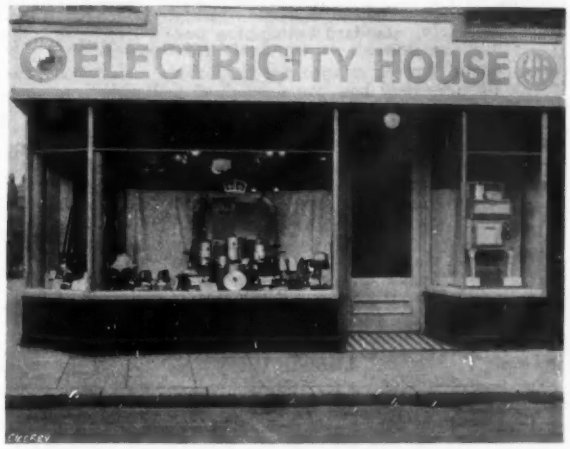
dining room and lounge of the reconstructed Good Intent Restaurant, 316, King's Road, Chelsea. To harmonise with the peach colour used for the furniture and the mural paintings depicting famous characters and associations in the history of Chelsea, 25-W amber lamps behind frosted glass have been utilised, plug points being provided for table lamps if required. An illuminated map at the far end of the dining room shows modern Chelsea with indication of places of historical interest. In the brasserie downstairs the lighting comes from two sets of three circular fittings on a red-enamelled wood mount, an electric clock also having a red dial with yellow hands and figures. The electrical installation was carried out by Messrs. T. Clarke & Co., Ltd., who employed Crabtree switches, Walsall boxes, and G.E.C. main switches and fuses. B.T. Installations, Ltd., were responsible for the electric clock installation.

Brook Motors Extensions

Brook Motors, Ltd., has in hand an extension of its Empress Works, Huddersfield, which will cover an area of 1,600 sq. yards. The extension will permit the output of the company to be raised considerably as the present two assembly conveyors will be increased to four. The extension also includes a complete nickel and cadmium plating plant, and all cast-iron and steel parts which have been machined will be treated with cadmium, whilst all brass and copper parts will be plated with nickel.

New Yorkshire Showroom

"Electricity House," the new showroom of Electrical Distribution of Yorkshire, Ltd., in Gowthorpe, Selby, was opened on September 16th. The showroom has an attractive decora-



The new showroom of the Electrical Distribution of Yorkshire, Ltd., at Gowthorpe, Selby

tion scheme of pale green and cream and is equipped in every way to meet the growing demands for electrical service. In the electric kitchen demonstrations of cooking were in progress during the day.

Dumfries Electrical Contractors

A branch of the Electrical Contractors' Association of Scotland has been formed in Dumfries, and the response to the appeal for members has been encouraging. The chairman of the branch is Mr. W. D. Erskine, and Mr. C. M. Hyslop is secretary. A lecture under the auspices of the branch was given by Mr. A. E. Roots, electrical engineer and manager of the Dumfries Electricity Department. Mr. Erskine, who presided, explained the objects of the Association, remarking that the electrical industry, next to agriculture, was the most important in the country. Mr. Roots chose as his subject "The Electric Grid."

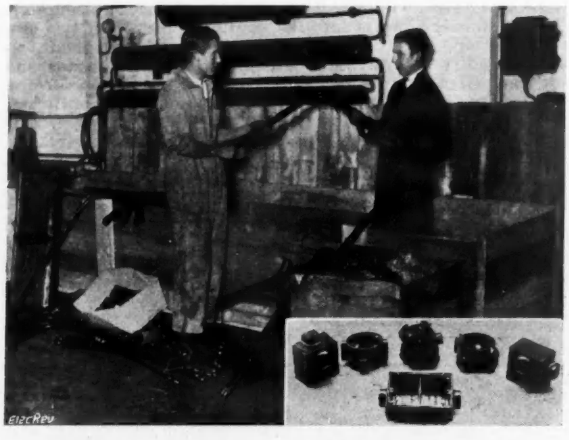
Works Visit

The Secretary of State for Scotland, Sir Godfrey Collins, together with the Earl and Countess of Mar and Kellie, Sir Wm. McKechnie, Secretary of the Scottish Education Department, Mr. David Milne, Assistant Secretary of the Scottish Office, and others, paid a visit to the "B.E.P." Works of the Harland Engineering Co., Ltd., Alloa, on September 26th, when the plant and products were explained by Mr. F. G. Warburton, works director, Mr. T. Mitchell, works manager, and other officials. After the visitors' tour of the works the staff and workers assembled to hear a short address by Sir Godfrey Collins.

A "Made-to-Measure" Library Installation

The dispatch this week by Messrs. G. N. Haden & Sons, Ltd., of the complete electrical equipment for the Witwatersrand University Library, South Africa, opens up an interesting new field for installation work. To comply with a provision of the contract that the equipment should be supplied ready for assembly and installation by unskilled local labour, the company has bent, cut and screwed 5,000ft. of ¾-in. conduit, and every item has been marked in accordance with numbers on the plans. Drawings will be sent out showing the

layout and reference number of every piece of pipe, together with other drawings indicating the wiring to be drawn into each individual length. Although this is believed to be the first "made-to-measure" installation ever undertaken, Messrs. Haden obtained a good deal of useful experience at the new Cambridge University Library, where a considerable amount of the work was done in workshops on the site. Practically all the fittings used for the South African library were specially



Packing up the tubing for the Witwatersrand Library. Inset: "H.C.1" universal boxes, special time-limit switches, and a standard switch-plug box

developed in connection with the Cambridge installation, the "H.C.1" universal box constructed of malleable iron and having seven holes being of outstanding utility. To ensure absolute fits and efficient continuity everywhere, even the switch and plug box spouts have been screwed, no clamp connections being employed. Time-limit switches allowing a person three minutes to find a book before putting out the light are a feature "borrowed" from the installation at the League of Nations Library, Geneva. The equipment includes 4,500 yd. of v.i.r. cable, three 20-way 15-A d.p. fuse boards, 50 switch and plug boxes, 30 time-limit switches, 150 "H.C.1" universal boxes, and 50 adjustable grid switch-plug boxes. The contract has been carried out to the requirements of Messrs. Roneo, Ltd., who are supplying the whole of the library equipment.

A Radio Diary

The first of the diaries for 1936 has just come to hand, from the *Wireless World* (price 1s. 6d., by post 1s. 7d.). This is neatly bound in dark blue leatherette and in addition to a complete list of the broadcasting stations of Europe and the Mediterranean coast, giving frequencies and wavelengths, it contains much useful data, including a number of circuit diagrams which should prove of value to radio constructors.

Large Fleets of Electrics

In our issue of September 27th we referred to an order for fifty electric vehicles for the Ormeau Bakery, Belfast, which was believed to be a record. Messrs. A. E. Morrison & Sons, Ltd., now inform us that the largest single order placed was by the Derby Co-operative Society for sixty vehicles, making their total fleet sixty-nine. Messrs. Morrison claim that the largest electric fleet in the world is that of the Midland Counties Dairies, Birmingham and Wolverhampton, which comprises eighty-three of the company's vehicles.

Corporation and Contractors at Croydon

Croydon electrical contractors have gained a point in their campaign (reported in our last issue) against the Croydon Borough Council's decision to compete with them by selling apparatus from its electricity showroom and undertaking the wiring for such appliances. At last Monday's meeting of the Council, it was decided that the Electricity Committee should confer again with the contractors before further action was taken. Councillor C. H. Gibson moved that the decision which led to the change of policy be rescinded. He contended that the vote on the question had not received the consideration which it merited. Hitherto the Council had been against the setting aside of personal enterprise, and he hoped that the same policy would be continued. The motion was seconded by Councillor F. W. Rees, but was opposed by Councillor H. T. Muggeridge, a former chairman of the Electricity Committee, who said that the one object of a committee running a public utility was to give the maximum service. The Electricity Committee made its arrangement with the contractors eight years ago. Unfortunately, experience had shown that the arrangement did not work. The showroom had not been used to the full in the interests of the public, nor in the interests of those engaged in the electrical trade. The success of the undertaking was not due to canvassing on the part of the traders, but to the cheapness of the supply and the propaganda carried on by the Corporation, and it was felt that the Department could no longer contend with the difficulties attending the present method of doing business. He emphasised that there was no intention on the part of the Council to interfere with the really profitable business now carried out by the contractors—the wiring of houses under the Council's schemes. Councillor Gibson's motion was lost by eighteen votes to thirty-four, and the Council then approved the recommendation of the Electricity Committee.

A "Clesco" Exhibit at Camberwell

At an exhibition to be held by the Camberwell Borough Council at the South London Art Gallery, Peckham Road, S.E.15, from October 15th to November 7th, the County of London Electric Supply Co., Ltd., will have a display depicting the progress and development of electricity.

The Business Efficiency Exhibition

A typewriter incorporating a small electric motor which operates carriage, keys, line and other movements and does away with 90 per cent. of the usual effort of typing is an outstanding exhibit at the Business Efficiency Exhibition now being held at the White City, London. It is a product of the International Time Recording Co., Ltd., which is displaying in addition a selection of its electric clocks and time recorders. An electric carriage typewriter is also shown by Burroughs Adding Machine, Ltd. Messrs. W. C. Davey & Co.'s range of "Sterdy" products includes office indicators (claimed to be the only noiseless ones operating on a.c.), "secret" and loud-speaking telephones, staff locators and a moderate-priced electric door lock. The "Telecator" office indicator (L. C. Smith and Corona Typewriters, Ltd.) now has a hand microphone incorporated, while the Reliance Telephone Co.'s comprehensive exhibit includes an automatic loud-speaking telephone with a visual indicator showing who is calling. Other types of intercommunication and loud-speaking telephones, staff locators, &c., are to be seen on the stands of Telephone Rentals (Telematic), Ltd., and Dictograph, Ltd. There are several other exhibits of electrical interest. The exhibition closes to-morrow (Saturday).

Social Events

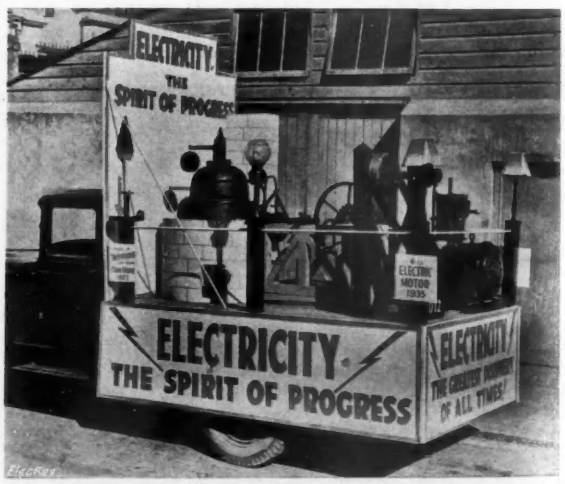
The G.E.C. Dramatic Society is presenting at the Fortune Theatre on October 28th and 29th the comedy "The Last of Mrs. Cheyney," by Frederick Lonsdale. The proceeds of the performances will be given to the charities of the Electrical Trades Commercial Travellers' Association, of which Mr. M. J. Railing, joint managing director of the G.E.C., is president-elect.

New "Nesco" Showrooms

New electricity showrooms which have been built by the North-Eastern Electric Supply Co., Ltd., at Blyth, were recently officially opened by the Mayor, Councillor J. R. Curry. The party was entertained at the King's Head Hotel, and the Mayor was presented with an inscribed tray and an electric coffee percolator set. Mr. W. F. T. Pinkney welcomed the guests, and others present were Messrs. E. H. E. Woodward, S. G. Pyke, E. J. Parnall, J. K. Knight, L. N. McCraith, and H. J. Cutts, who will be in charge of the new branch.

A Lighting and Installation Convention

A lighting and installation convention arranged by the Simplex Electric Co., Ltd., under the auspices of the Coventry Corporation Electricity Department was opened at the Department's showrooms on Monday last by the Mayor of Coventry. Invitations have been issued to all electrical men in



A vehicle entered by the Plymouth Corporation Electricity Department in a recent local pageant

Coventry and district. The convention includes an exhibition of lighting equipment and installation material at which Simplex demonstrations are being given. Each day lectures are being delivered on public lighting and illumination in general, the preparation of industrial schemes, the design of lighting equipment, industrial lighting and works installation practice, the programme including a two-day illumination

design course for technical students and engineers. The convention closes to-morrow, Saturday.

The Torquay Showrooms

The new showrooms of the Torquay Corporation's Electricity Department, which were to be formally inaugurated on Wednesday by Sir John Brooke, have been erected at a cost of £37,000. The new building occupies an area of about 7,600 sq. ft., and contains five floors, with provision for the erection of a further floor as and when required. The Union Street façade has a large bronze-framed opening to the showrooms,

The main showroom and the model bathroom at the Torquay Electricity Department's showrooms

containing the entrance and two non-reflecting windows, each of which is flanked by a further small window intended for special display purposes. Electrical appliances of all descriptions are displayed in the showroom on the ground floor, while cubicles have been fitted out as a bathroom and kitchen. There are also showcases for electric fires. Concealed lighting by mirror reflectors provides the main lighting for the showrooms, being augmented by a mirror ceiling fitting and two wall brackets. The lecture hall is situated at the rear of the showrooms and has seating accommodation for 360. Administrative offices occupy the first floor, and on the second floor is situated the control room which eventually will contain supervisory apparatus to control the transformers and switchgear in the main sub-stations throughout the borough. There is an auxiliary showroom in the basement for the display of various lighting fittings, and there are also the heating chamber and a sub-station. The building, generally, is heated by low-pressure hot-water pipes and radiators from an electrode boiler, and electric tubular heaters have been installed in certain offices and cloakrooms. Ceiling heating is provided in the conference room.

Variable Colour-lighting

Referring to the note under the above heading in our last week's issue, Mr. Kenneth E. Caine, of Messrs. Pernot & Co., Ltd., informs us that he collaborated with Architectural Lighting, Ltd., in designing the system, which is known as the Pernot Architectural Lighting System and is marketed by both companies. At present, glass colour screens are not used owing to the difficulty of obtaining glass in uniform shades.

The S.S. " Strathmore "

With reference to the article which appeared in our September 27th issue describing the electrical equipment of the S.S. *Strathmore*, we are asked by the Artic Fuse & Electrical Manufacturing Co., Ltd., to state that the whole of the electrical distribution fuse-gear for this vessel was supplied by them.

For Sale

The West Central Merchandise Mart will sell by auction on October 16th and 17th the stock of electrical factors.

The Governors of King Edward's School, Witley, Surrey, have for disposal a complete power house plant.

Trade Announcements

British Electrical Repairs, Ltd., of Manchester, has taken over the repair business and works of Messrs. MacWhirter & Sons, Ltd., Wharf Street, Cardiff. Mr. MacWhirter is to carry on in other lines at 35-37, Penarth Road, Cardiff. Mr. Todd, who has been closely connected with repair work in South Wales, has been retained as manager, and Mr. A. C. MacWhirter will still continue to be interested as a local director. In addition to its works at Manchester and Cardiff, British Electrical Repairs, Ltd., has branches at Birmingham, Edinburgh, Glasgow, London, Newcastle-on-Tyne and Swansea.

The Dowsing Co. (Electrical Manufacturers), Ltd., asks us to state that its new factory at Kangley Bridge Road, Lower Sydenham, S.E.26, is now its only address, it having given up the Bollo Lane factory, Acton, and its showrooms in Baker Street, W.

Messrs. E. Elliott, 315, Summer Lane, Birmingham, have purchased from Messrs. Harrison (Birmingham), Ltd., the entire plant, goodwill, and contracts of the bakelite moulding branch of their business in Cheapside, Birmingham, where Messrs. Elliott will continue manufacture.

Messrs. Richard Crittall & Co., Ltd., heating and ventilating engineers, have moved to more extensive premises at Bush House. Their associated companies, the Magnetic Valve Co., Ltd., and the Crittall Ventilator Co., are also installed in the new offices. (Telephone No. Temple Bar 7777.)

From Monday next the telephone number of the Erith Works of Messrs. Callender's Cable & Construction Co., Ltd., will be " Erith 3030."

The London Fan & Motor Co., Ltd., has taken additional premises at 38, Alfred Place, W.C.1.

Britannia Electric Lamp Works (1934), Ltd., has taken offices, showrooms, trade counter and stores at 92-94, Paul Street, London, E.C.2.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price, October 9th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate	£15 10s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll	£11	—
a Soda Chlorate ... ... per lb.	3¼d to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ... ,,	1/2 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£206	—
Grade II ... ... ,,	£142	—
Grade III ... ... ,,	£74	£1 inc.
c Brass (rolled metal 2" to 12" basis) per lb.	7¼d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	9¾d. to 10d.	¼d. inc.
c ,, Wire, basis ... ... ,,	7¼d.	¼d. inc.
c Copper Tubes (solid-drawn) ... ,,	10¼d.	¼d. inc.
g ,, Bars (best selected)... ... per ton	£68	£2 inc.
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£41 5s.	£1 15s. inc.
d ,, ,, Wire Rods ... ,,	£45 15s.	£1 15s. inc.
d ,, ,, H.C. Wire ... per lb.	7 7/16d.	1/16d. inc.
f Ebonite Rod ... ... ,,	1/6 to 2/- plus	—
f ,, Sheet ... ... ,,	1/3 to 1/6 10%	—
n German Silver Wire ... ... ,,	2/5	—
k Gutta-percha, fine ... ... ,,	nom.	—
k India-rubber, Para-fine ... ... ,,	5½d.	½d. inc.
i Iron, Pig. (Cleveland No. 3) ... per ton	67/6	—
i ,, Wire galv. No. 1, P.O. Qual... ,,	£20	—
g Lead, English Pig ... ... ,,	£21	£2 15s. inc.
g Mercury ... ... per bot.	£11/5 to £11/15	2/6 dec.
e Mica (in original cases) small ... per lb.	6d. to 1/-	—
e ,, ,, medium ... ,,	5/- to 10/-	—
e ,, ,, large ... ,,	10/6 to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11¾d.	½d. inc.
p ,, ,, rolled strip & sheet ,,	11½d.	½d. inc.
p ,, ,, wire ... ... ,,	1/0½	½d. inc.
o Platinum ... ... per oz.	£7 17s. 6d.	7/6 inc.
d Silicium Bronze Wire ... ... per lb.	8 7/16d.	1/16d. inc.
g Spelter ... ... per ton	£16 17s. 6d.	—
r Steel, Magnet, in bars ... ... per lb.	7¼d.	—
g Tin, Block (English) ... ... per ton	£228 5s.	£4 5s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha, and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our " Business Notes " under the same heading.

New Catalogues and Lists

Drake & Gorham Wholesale, Ltd., 77, Long Acre, London, W.C.2.—Several illustrated art catalogues for 1936 on electric lighting fittings, "Dragor" wash-boilers, radio receivers, and electric clocks. Also a leaflet on the "Tecal" (a combined alarm and automatic tea-making device), and a catalogue of fires and miscellaneous domestic appliances.

Electroservice, Ltd., 31, Waterloo Road, London, S.E.1.—A catalogue of accessories, fittings, cables and bells.

Davis Bros., Ltd., 36, St. Martin's Court, Charing Cross Road, London, W.C.2, have issued details of a new long-range flood-lighting projector.

Crofts (Engineers), Ltd., Thornbury, Bradford.—A catalogue of variable-speed gears.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4, has issued its 1936 catalogue of electric domestic appliances, and also a small booklet which can be overprinted.

Hart Accumulator Co., Ltd., Stratford, London, E.15.—A price-list of type "MR" cells for marine service.

Rawlplug Co., Ltd., Cromwell Road, London, S.W.7.—"Round the World with Rawlplugs," a new booklet on the development of "Rawlplugs."

Cooper & Smith, 14, Chicheley Street, London, S.E.1.—A leaflet on "Heley" lighting fittings.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—"How Much is Your Life Worth," a booklet on automobile lamps. Wiring systems are dealt with in another new booklet.

H. J. Scott & Co. (Belfast), Ltd., Volt Works, Ravenhill Avenue, Belfast.—A price-list of "Scott" motors.

Allen West & Co., Ltd., Brighton, 7.—Details of recently introduced small motor starters.

Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.—A leaflet describing new season's fires.

British Aluminium Co., Ltd., Adelaide House, E.C.4.—A book in which aluminium architecture and decoration are dealt with photographically.

Company Liquidations

J. Briggs (Electrical Contractors), Ltd., Berkeley Street, London, W.1.—The creditors were called together recently, when the statement of affairs showed ranking liabilities of £7,057. The indebtedness to the trade was £1,250 and there were cash creditors for £5,807. The total assets were £849, or a deficiency, so far as the creditors were concerned, of £6,208. The issued share capital of the company was £4,702. The company was registered in January, 1927, taking over an existing business. Of the issued share capital of £4,702 some £2,100 was issued to the vendor in consideration of the assets transferred to the company. The balance of the issued capital was allotted for cash. The trading figures showed that during the year to March, 1928, there was a net loss on the trading of £695, but in the four following years net profits were earned of £754, £130, £229, and £307 respectively. During the year to March 31st, 1933, there was a net loss on trading of approximately £2,700, and a further account prepared as at July 31st last showed a loss of £1,202 on a turnover of approximately £13,500. The heavy loss in 1933 was due to an unprofitable contract which was carried out overseas. Recently a distraint was levied on the stock and a petition had been presented for the compulsory winding up of the company. Mr. G. A. Ramsay, a cash creditor for £5,620, agreed to withdraw his claim if the matter was dealt with in voluntary liquidation. A resolution was passed in favour of the voluntary liquidation of the company being continued with Mr. Barnes, of Messrs. Lord, Foster & Co., 37, Walbrook, London, E.C., as liquidator. A committee was also appointed consisting of the representatives of the National Electrical Supplies, Ltd., British Electrical Manufacturing Co., Ltd., and Johnson & Phillips, Ltd. It was stated that the petition would be withdrawn.

The Leatherhead and District Electricity Co., Ltd.—Meeting November 5th at 46-47, New Broad Street, E.C., to receive an account of the winding-up by the liquidator, Mr. D. Robertson.

Llanrwst Electricity Supply Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. C. Gardner, 24, Coleman Street, E.C.

Bankruptcy Proceedings

J. Holder, 31, Denehurst Gardens, Richmond, Surrey, electrical engineer.—This debtor applied for his discharge at the Court House, Garratt Lane, Wandsworth, recently. The receiving order was made this year, and the liabilities amounted to £452. The discharge was granted subject to twelve months' suspension.

R. L. D. Mathews, wireless and electrical engineer, 24, Kingsway Road, Burnham-on-Sea.—First meeting October 14th at 26, Baldwin Street, Bristol. Public examination November 12th at the County Offices, Bridgwater.

S. D. C. Orchard (Empire Radio), electrical engineer, 43, Malmesbury Road, Shirley, Southampton.—First meeting October 12th at 10, Rockstone Place, Southampton. Public examination October 16th at the Court House, Castle Square, Southampton.

W. J. Davies, radio and electrical engineer, 230, Great North Road, Woodlands, Doncaster.—First and final dividend of 1s. 11d. in the £, payable October 15th at 27, York Street, Sheffield.

M. Cohen (Lightning Radio), radio dealer, 2, Priestfield Road, Ellesmere Port.—Last day for receiving proofs for dividend October 16th. Trustee, Mr. J. Allcorn, Government Buildings, Victoria Street, Liverpool, Official Receiver.

S. W. Godfrey, electrical engineer, 44, Cromwell Road, Sprowston, Norfolk.—Receiving order made September 27th on a creditor's petition.

H. Hawkins, wireless dealer, 171a, King Street, Fenton, Stoke-on-Trent. Receiving order made October 2nd on debtor's own petition.

Dissolution of Partnership

J. V. Wilson & Co., electrical and radio engineers, 34, Evesham Street, Redditch. Messrs. W. J. Layton and J. V. Wilson have dissolved partnership. Mr. Wilson will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Algeria.—ELECTRICAL PROGRESS.—Considerable progress is being made in the electrification of Algeria. Although subsidies were authorised as early as 1923 it was not until 1927 that any real attempt was made to build electric networks. In 1928 the total length of high-voltage network in the country was 2,900 km.; last year this figure rose to 7,378 km., and since then it has further increased. Algiers has three plants with a total capacity of 78,800 kVA, Oran two with a capacity of 22,000 kVA, Philippeville one plant of 10,000 kVA and Bône one of 17,600 kVA. So far little has been done in hydro-electric development, only one or two small plants being in operation, but it is probable that in future more will be done in this direction.

Ashton-under-Lyne.—LOWER FLAT RATE.—The Town Council is to reduce the flat rate for lighting from 4½d. to 3½d. per kWh.

Australia.—SYDNEY.—The 1934 report of Mr. H. R. Forbes Mackay, general manager of the municipal electricity undertaking, reveals an increase in the revenue for the year of £8,333, making a total of £2,541,588, while working expenses rose by £6,026 to £1,026,612, the net profit of £198,370 being slightly less than in the previous year. A total of 484,456,500 kWh was generated, and the sales amounted to 398,632,000 (an increase of 35,845,000 kWh, or nearly 10 per cent.). The maximum demand rose from 114,200 to 128,400 kW, the kW connected from 627,215 to 659,379, and the number of consumers by 7,711 to 217,392. The average cost per kWh was 1.411d., and the revenue 1.49d.

Billingham-on-Tees.—BETTER STREET LIGHTING.—The Urban District Council is to improve the electric street-lighting system.

Bolton.—SUPPLY AT TONGE MOOR.—The Electricity Committee is to improve the supply in the Tonge Moor district at a cost of £2,000 for switchgear and £1,200 for mains.

Chester.—NEW EQUIPMENT.—In order to provide a supply to the Mouldsworth pumping station of the West Cheshire Water Board the City Council has applied for a loan of £2,500 for h.v. and l.v. overhead lines and £1,000 for switchgear.

AMENDED TARIFFS.—In place of the present lighting flat rate (within the city) of 4d. per kWh, with a scale of discounts at the end of the financial year, there is to be a charge of 4d. per kWh for the first 1,000 kWh per quarter, with a five per cent. reduction for each additional 1,000 kWh, until the rate is reduced to 2d. per kWh. The business, domestic two-part and other tariffs have also been modified in favour of the consumers.

ELECTRICAL PROGRESS.—It is stated in the annual report of the electrical engineer and manager (Mr. S. E. Britton) that the four years' task of changing over the installations of 6,111 consumers from d.c. to a.c. has been completed. Considerable advance has been made in popularising an extended use of electricity in small premises, and it is estimated that during the last three years 17,450 electrical appliances have been connected. During the past year the number of consumers increased by 1,812, bringing the total to 14,846. The report adds that, of the 1,574 agricultural holdings in the Corporation's area of supply, 523 were using electricity at March 31st last, and during the year these consumers purchased 1,628,481 kWh of electricity, producing an income of £9,398.

Coventry.—GENERATING STATION EXTENSIONS.—The City Council has confirmed a recommendation by the Electricity Committee that application shall be made to the Electricity Commissioners for consent to an extension of the Longford generating station and for permission to borrow £306,000 for that purpose.

Dover.—APPARATUS ON HIRE.—The Electricity Commissioners have sanctioned a loan of £1,000 for the provision of electrical apparatus to be let out on hire.

Egypt.—WATER POWER AND IRRIGATION.—The Egyptian Ministry of Public Works is examining two hydro-electric and land irrigation projects. One is for development at the Bahr Youssef falls, by means of which it is believed that over 50,000 acres of land in the Moudirieh Guizeh can be irrigated. Another scheme envisages the supply of water to over 70,000 acres in conjunction with hydro-electric development at the Nay-Hamadi falls.

France.—HYDRO-ELECTRIC SCHEMES.—Before the end of the year eight new hydro-electric plants will have been put into operation in France. The most important of these is the Marèges plant of the Chemins de Fer d'Orléans, already partly in service, which, when fully in operation, will have a capacity of 33,100 kW. The Sautet plant of the Société des Forces Motrices de Bonnex-Drac comes second with a capacity of 18,000 kW. The Bisorte plant, with 12,300 kW, and a number of smaller plants will bring the total additional generating capacity to 76,360 kW.

Glasgow.—ELECTRICITY REFUSED.—Applications made by tenants of Council houses on various estates to have gas replaced by electricity have been refused by the Housing Committee as it is estimated that the cost would be £18,000.

Guildford.—MAINS.—The Electricity Committee is seeking sanction to borrow £10,000 for mains.

Irish Free State.—ELECTRICITY TO SUPERSEDE GAS.—The public lighting of Rosslare, County Wexford, is to be changed over from gas to electricity during the current month. Electricity from the Shannon scheme has already been introduced into Rosslare, and a 10,000-V cable conveys a supply to the port, where electrically driven cranes are now in operation.

Japan.—POWER PROJECT.—Our Yokohama correspondent reports that the Kwansai Power Co., Ltd., is said to have been granted a charter to harness the Mase River. Six other applications were refused.

Liverpool.—POWER STATION EXTENSIONS.—The City Council has been asked to approve application being made to the Electricity Commissioners for consent to extensions (at the direction of the C.E.B.) at the Clarence Dock generating station at an estimated cost of £767,580.

London.—BATTERSEA.—The Electricity Committee is to provide a supply of electricity to 317 premises at a cost of £2,436.

BERMONDSEY.—The Electricity Committee recommends reducing the charge for rental installations from 2½d. to 2d. per kWh and the running charge for the two-part tariff from ¼d. to ¼d. per kWh.

POPLAR.—The switchgear at the High Street sub-station is to be replaced by the Electricity Committee at a cost of £3,508, and the Committee has also recommended the erection by direct labour of a sub-station at Libra Road at a cost of £2,268.

ST. PANCRAS.—The Electricity Committee recommends a reduction in the initial charge for the rental-wiring (small dwellings) scheme from 5½d. to 5d. per kWh, a concession amounting to £3,268 a year.

The Electricity Committee is negotiating with the Islington Borough Council with regard to lighting the boundary thoroughfares at a cost of £2,526 to St. Pancras and £4,507 to Islington.

Mains are to be extended at a cost of £3,122 in connection with a supply to the Ferdinand Place estate, and at a cost of £4,115 to provide a supply to premises being erected in Wicklow Street.

LIGHTING A RAILWAY STATION.—Fenchurch Street railway station, the second oldest in London, has been largely reconstructed and equipped with electric signalling. Amongst the improvements is the new electric-lighting installation. Siemens electric-discharge lamps and fittings have been used, and, as will be seen in the accompanying photograph, the light is effectively distributed, visibility being good and glare absent. The installation under the main roof consists of eight "Sieray" electric-discharge units mounted at a height of

The new lighting at Fenchurch Street station

approximately 20 ft. above platform level. Each unit comprises a "Preston-Sieray" lantern containing one 250-W discharge lamp and three 75-W tungsten-filament lamps, the latter being arranged at 120-deg. intervals around the discharge lamp. Over the platforms the lanterns are spaced 66 ft. apart, with an interval of 40 ft. between the two lines of lanterns. Owing to the intervention of the line of local ticket-barrier lights the two lanterns outside the ticket barrier are 77 ft. from the nearest platform lanterns and are 52 ft. apart. The area lighted is approximately 290 ft. long by 104 ft. wide at platform level, and the height to the bottom of the roof trusses is approximately 40 ft. The total lighting load under the new system is 5.2 kW.

Manchester.—MODIFIED CHARGES.—The Electricity Committee proposes to offer wash-boilers for hire at 2s. 6d. a quarter instead of 4s., as a simpler and cheaper model is now available, while it is also proposed to reduce the charge for water heaters from 3s. 9d. to 2s. 9d. a quarter. To encourage display and decorative lighting at large stores, cinemas and shops the sliding scale has been amended.

Mansfield.—SANCTION TO LOANS.—Sanction has been obtained by the Electricity Committee to borrow £20,000 for mains and services and £10,000 for meters.

Nelson.—MANY MORE CONSUMERS.—Mr. T. Dawson Martin, engineer and manager of the Electricity Department, reports that 952 new consumers were connected during the year ended March 31st last, bringing the total to 8,925, and representing an increase of 11.94 per cent.

SUPPLY EXTENSION.—The Lancashire Electric Power Co. has informed the Town Council that it has decided not to proceed with an application for a special order for supplies to Roughlee, Barley, Newchurch, &c., and the Council will now seek powers to supply Old Laund Booth, Roughlee, Barley, and Goldshaw Booth.

Paignton (Devon).—OPTION TO PURCHASE UNDERTAKING.—It was announced on October 2nd that the Urban District Council had notified the Paignton Electric Light & Power Co. that it was considering the purchase of the undertaking in 1937, when the next septennial option occurs.

Plymouth.—HIRE OF COOKERS.—An electric cooker hire scheme has been introduced by the City Council, the charges ranging from 6s. to 10s. per quarter.

Poland.—NEW WORKS AT GDYNIA.—In view of the growth of electricity consumption in Gdynia, the directors of the Elektrownia Grodek have decided to carry out a large extension to the generating plant, and application has been made for sanction to proceed with a scheme for the establishment of a new steam power station at an estimated outlay of 3,000,000 zlotys. Part of the cost will be defrayed out of the company's own resources and part by means of credit in goods which are to be contracted for, according to the *Gazeta Handlowa*, either in England or in Switzerland. Most of the share capital of the Grodek is held in Poland, 30 per cent. being in French hands.

Portsmouth.—CONSUMERS' PROTEST AGAINST CONTRIBUTIONS TO RATES.—At a conference of representatives of electricity consumers the following resolution was passed: "This conference of organisations representative of consumers desires to call the attention of the Electricity Commissioners to the financial administration of the undertaking, which has kept prices to the consumers above what they need have been and maintains prices at scales in excess of what they could reasonably be, through imposing charges on the undertaking which are an indirect contribution for the relief of the rates, and by these means exceeding the statutory limit of contributions which can be made to the relief of rates."

Preston.—YEAR'S PROGRESS.—It is encouraging to read in the annual report of Mr. D. Adams, the borough electrical engineer, that the increase in the amount of electricity used for power purposes during the year ended March 31st last was 23 per cent. Domestic supplies showed a similar proportionate increase, and 1,416 additional cookers, 513 wash-boilers, and 433 water heaters were hired out, bringing the respective totals on circuit to 9,032, 4,100 and 1,150.

Sheffield.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £2,412.

Southport.—BATTERY CHARGING TARIFF.—The following rate for charging electric vehicle batteries has been fixed:—3½d. per kWh from 4 p.m. to 9 p.m., and ½d. per kWh at other times, all energy to be registered by a two-rate meter.

South Shields.—SUB-STATIONS.—Two sub-stations costing £100 and £300 are to be erected by the Town Council on the Prince Edward Road estate.

Stanley (Durham).—LOANS.—The Urban District Council has received sanction from the Electricity Commissioners to borrow £2,000 for improvement works.

Stoke-on-Trent.—AERODROME INSTALLATION.—The Aerodrome Committee is to prepare plans for the installation of electric lighting and power, floodlighting equipment, landing lights and wireless apparatus at the Meir aerodrome.

SUB-STATIONS.—The Electricity Committee is to borrow £10,000 for a sub-station at Longton and £4,150 for another at Trent Vale.

WIRING COUNCIL HOUSES.—In future two power plugs are to be provided by the Electricity Committee in all new Council houses.

Stretford.—LOWER CHARGES.—The Stretford and District Electricity Board has announced the following amended charges:—Lighting flat rate, 4½d. per kWh; lighting maximum demand tariff, a fixed charge of £7 per annum per kW of m.d., plus 1½d. per kWh; domestic heating and cooking "unit" charge for 200 kWh or more per quarter, reduced from 1d. to ¾d.; and the lighting rate in all such cases from 4½d. to 4d. per kWh (two-part lighting charge reduced correspondingly where it is in force); all-in rate, an annual fixed charge of 12½ per cent. up to £40 net rateable value, and 7½ per cent. over £40, plus ½d. per kWh consumed; shops, the same as the domestic rate. A discount of 2½ per cent. is allowed for prompt payment of accounts.

Sweden.—POWER PLANT EXTENSIONS.—A new electric power plant, with a capacity of 50,000 h.p., is to be built by the Stora Kopparbergs Bergslags Aktiebolag (The Great Copper Mountain Mining Co.), at Langhagsforsen, a waterfall in the Dalälven river. The cost is estimated at 10 million kronor (£526,300), and the work will take three years. The Swedish Government Waterfalls Department requests a State appropriation of 16 million kronor (£842,000) for the purpose of extending the power network and for the extension of power plants.

Tredegar.—SUCCESS OF ELECTRICITY SCHEME.—Since the supply was inaugurated in January last the work of electrification in Tredegar, which had been called the "all-gas" town, has outstripped the most sanguine expectations. A report sent to us by Mr. W. Davies, who is in charge of the electricity scheme under Mr. D. W. Davies, M.I.Gas E., engineer and manager to the Gas, Water and Electricity Department, shows that, at the end of the first eight months, the consumers numbered 510 as against an estimated 90 at the completion of a year's working. Similarly, the maximum demand was 150 kVA against 50 kVA, and the electricity sold (90,000 kWh) equalled the estimate for twelve months; Mr. Davies anticipates that the m.d. after a complete year will be at least 200 kVA and the consumption 200,000 kWh. A disturbing factor is that there have been five supply failures, one of eight hours duration, and the question of obtaining an alternative supply is being considered.

Tynemouth.—HEATING COUNCIL HOUSES.—The Electricity Committee is to obtain estimates for the provision of heating points in Council houses.

Weston-super-Mare.—SUPPLY FROM THE GRID.—The Electricity Commissioners and the Weston-super-Mare Electric Supply Co. are considering proposals for the local undertaking to take supplies from the grid from March to October. At one time it was proposed to take the whole of the supply from the grid, but arrangements have been made to take a partial supply and to utilise the local generating station during the winter months.

Wimbledon.—SUB-STATIONS.—The Electricity Committee has obtained sub-station sites on the Kingston Vale estate, New Malden, and the Station estate, Worcester Park. Sanction has been obtained to borrow £13,650 for sub-stations.

MAINS EXTENSIONS.—The Electricity Committee has arranged with the Cannon Hill Estates, Ltd., to extend mains to supply the Mid-Coombe estate at Trapps Lane, New Malden.

Wolverhampton.—LIGHTING.—The Electricity Committee is to install 60-W lamps on housing estates at a cost of £2,382.

Workington.—ELECTRICITY FOR COUNCIL HOUSES.—The Housing Committee is to install electricity in fifty Council houses to be erected on the Salterbeck estate.

SUPPLY FOR PUMPING.—A supply of electricity is to be given to the pumping station of the St. Helen's Colliery Co. at Barepot.

Yorkshire.—NORTH RIDING RURAL SUPPLIES.—The North-Eastern Electric Supply Co., Ltd., hopes to provide an electricity supply shortly to Osmotherley, Ingleby, Arncliffe, Ingleby Cross and East Harlsey. Difficulty has been experienced by the company in obtaining wayleaves to carry wires over certain fields, but this has now been overcome.

Traction

Australia.—ADELAIDE TROLLEY-BUSES.—The Adelaide tramways are to inaugurate trolley-bus services on three of the present tramway routes, and twenty vehicles with seating capacities of sixty-four are required.

Bolivia.—HYDRO-ELECTRIC SCHEME.—According to *The Times* a contract is about to be signed for the utilisation of Lake Titicaca as a source of electric power for the Bolivian railways and the mining and industrial works of the Republic.

Denmark.—COPENHAGEN SUBURBAN SERVICE.—A new service operated by 550-h.p. Diesel-electric railcars has just been introduced between Copenhagen, Ringsted and Roskilde, and will continue until the summer of 1936, by which time the electrification of these routes will have been completed.

France.—RAILWAY ELECTRIFICATION.—With the opening of the barrage at Marèges on October 5th a further section of the Paris-Orleans railway system between Vierzon and Brive was converted to electric traction. The length of the line now operated by electricity is 2,049 km. (1,273 miles).—*The Times.*

Germany.—ELECTRIC RAILWAYS.—The length of the lines worked by electricity in Germany has risen from 1,292 km. in 1929 to 1,950 at the end of July last, when 471 locomotives and 1,031 motor coaches were in use. The annual consumption is estimated at 340 million kWh. Work on the conversion of the line between Nürnberg, Halle and Leipzig, a length of 350 km., has now been begun.

Glasgow.—SUBWAY REVENUE.—The general manager of the Transport Department (Mr. Lachlan MacKinnon) recently reported to the Transport Committee that the receipts from the subway had increased by £100 per week since electric traction was introduced.

Hull.—TROLLEY-BUS SCHEME.—The Corporation Finance Committee has decided to forward to the City Council the scheme of the Transport Committee for replacing the trams by trolley-buses, together with a report by the city treasurer, but without any expression of opinion on the financial aspect of the proposals. The estimated cost of the conversion is £194,000.

India.—RAILWAY ELECTRIFICATION.—According to *Indian and Eastern Transport* the approval of the Railway Board has been obtained for the extension of the electrified system of the Bombay, Baroda, and Central India Railway. At present twenty-one miles of the main-line system are electrified between Bombay and Borivli. The new extension will be from Borivli to Viram, a distance of sixteen miles, which will facilitate the handling of suburban traffic.

Japan.—BIG MAIN-LINE SCHEME.—After various small electrification schemes have been completed the conversion of the Tokaido main line from Numazu, the present electric terminus, to Kobe, a distance of 286 miles, is to be put in hand. The conversion will be completed by 1941, at an estimated cost of 50,000,000 yen.

London.—TROLLEY-BUSES.—Work is at present in progress on the construction of a trolley-bus route from the Crystal

Erecting poles at Sutton for the new trolley-bus service

Palace to Sutton. Part of this is at present served by trams, but at Sutton, as shown in our illustration, new poles and overhead equipment are being erected. We understand that the vehicles to be used will be the Leyland buses described in the ELECTRICAL REVIEW of September 6th.

PADDINGTON.—Tenders are to be obtained by the Borough Council for the installation of traffic signals at an estimated cost of £8,750.

Lytham St. Annes.—FUTURE OF THE TRAMWAYS.—Ribble Motor Services is stated to have expressed its willingness to negotiate for the Lytham St. Annes transport system, for which the Blackpool Corporation has already made an offer. The company offers to negotiate on the same basis as in 1931, when it undertook to run the undertaking and to give the Corporation one-third of the profits, guaranteeing the average gross profits for the previous three years. It was then estimated that the Corporation would receive about £10,000 a year. The negotiations continued for two years, and finally the Corporation would not agree to the proposal. It is understood that the company, if successful, would substitute a fleet of motor buses for the trams.

Manchester.—RAILWAY ELECTRIFICATION.—It was announced at a recent meeting of the Manchester and District Regional Planning Committee that the L.M.S. and L.N.E.R. Companies are conducting an inquiry into the practicability of railway electrification in South-east Lancashire.

Warrington.—REPORT ON ELECTRIC REFUSE VEHICLES.—The Sanitary Committee has prepared a report on the working of the six Orwell electric vehicles used for refuse collection. Five of the vehicles have completed eleven years' continuous service and one seven years' service. No serious mechanical trouble has been experienced. The cost of energy per mile run was stated to be 2.11d.

Communications

China.—MARINE WIRELESS.—Following European practice, with a few exceptions all sea-going steamers of more than 1,600 tons are now required to install wireless apparatus under regulations recently adopted by the Legislative Yuan. Vessels which are exempted include passenger steamers plying not more than twenty nautical miles from the shore and those with a route between coastal ports not exceeding 200 nautical miles; freighters of less than 1,600 tons which do not ply beyond 150 nautical miles from shore; and junks and vessels of simple structure not intended for deep-sea navigation. The Government intends to exercise strict supervision over wireless installations on ships, and no wireless station may be operated until a licence, renewable every five years, has been granted by the Ministry. One of the regulations requires all wireless operators on ships to be Chinese citizens, holding certificates of competence issued by the Chinese Ministry of Communications.

Czechoslovakia.—WIRELESS LICENCES.—Holders of wireless receiving licences in Czechoslovakia numbered 747,224 at the beginning of August last, an increase of 53,530 during the first seven months of the year.

London.—TELEVISION.—It is reported that test transmissions from the Alexandra Palace high-definition television station may be made in March next.

Palestine.—BROADCASTING.—*Reuter* states that the new Palestine broadcasting station will commence operation during December.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—BRISBANE.—November 26th. City Electric Light Co., Ltd. Switchgear, including control panels, instrument transformers, switches, circuit-breakers, &c., for the Bulimba power station. (T.Y. 10150.)*

Birmingham.—October 12th. Electric Supply Department. Meters. (October 4th.)
October 16th. Cookers for twelve months. (September 27th.)
November 5th. Motor convertors. (See this issue.)

Burton-on-Trent.—October 18th. Electricity Department. Electric heating apparatus. (September 13th.)

Cardiff.—October 15th. R.D.C. Electricity Department. 11-kV cables and switchgear, kiosk, and 150-kVA transformer. (October 4th.)

Carlisle.—October 21st. Electricity Department. Transformers. (September 27th.)

Egypt.—CAIRO.—November 2nd. Ministry of the Interior. Diesel generating plant for the Damietta power station. (T.Y. 10138.)*
November 7th. L.c. armoured cable, l.p. switchgear, insulators and pole line hardware for El Arish. (T.Y. 10136.)*
November 25th. Electrical measuring instruments for the Damanhour power station. (T.Y. 10135.)*

Epsom & Ewell.—October 14th. Electricity Department. Street-lighting standards and bracket fittings. (October 4th.)

Greenock.—Public Library Committee. Electric installation at the new branch library. Forms from R. H. Yorston, Public Library.

Harefield.—October 30th. Middlesex County Council. Automatic telephone system at County sanatorium. (See this issue.)

India.—October 14th. Bombay, Baroda and Central India Railway Co. Insulators and insulator fittings, line fittings and switches. (September 27th.)
NEW DELHI.—October 30th. Stores Department. Train lighting batteries. (T.Y. 10156.)*
November 28th. Flameproof electric cables as required under an annual rate contract. (T.Y. 10155.)*

Irish Free State.—DUBLIN.—October 25th. Electricity Supply Board. 25,000-kVA, 5/38-kV transformer. (September 20th.)

London.—POPLAR.—October 16th. Borough Council. Cable. (October 4th.)
SOUTHWARK.—October 23rd. Borough Council. Cables. (See this issue.)

Manchester.—October 18th. Electricity Committee. A.c. electric fan motors. (October 4th.)

Marlborough.—October 16th. Electricity Department. Cables, protective tiles, joint boxes, service connections, fuseboards and accessories, l.p. overhead linework on wood poles, and transformers. (October 4th.)

New Zealand.—WELLINGTON.—November 25th. Posts and Telegraph Department. Ammeters, voltmeters, and high and low-voltage relays. (T.Y. 10127.)*
January 28th, 1936. Public Works Department. 50-kV switchgear and steelwork for Section 425 of the Arapuni scheme. (T.Y. 10154.)*
January 21st. 110-kV switchgear and steelwork for the Paraparaumu sub-station. (T.Y. 10152.)*
DUNEDIN.—December 9th. City Corporation. One 7,500-kVA, 6,600-V, three-phase, 50-cycle, totally enclosed, self-ventilating synchronous condenser. (T.Y. 10124.)*

Reigate.—October 16th. Borough Council. Electric storage heaters at Redhill fire and police stations. (October 4th.)

Rochdale.—October 23rd. Electricity Department. Meters. (See this issue.)

St. Helens.—October 23rd. Electricity Department. Cables. (See this issue.)

Sheffield.—October 11th. Electricity Department. Five 450-kVA three-phase outdoor transformers. (September 27th.)

South Africa.—CAPE TOWN.—November 6th. Electricity Department. Two horizontal spindle, electrically driven centrifugal sewage pumps, with motors, piping, &c. (T.Y. 5323.)*

Swansea.—October 18th. Electricity Department. Interior and exterior lighting installations, heating circuits, &c., at Tir John power station. (September 27th.)

Uruguay.—MONTEVIDEO.—November 25th. State Electricity Supply and Telephone Administration. 75,000 40-W, 225-V, and 1,500 500-W, 225-V electric lamps. (T.Y. 10137.)*

Walkington.—October 29th. East Riding Mental Hospital Visiting Committee. Installation of electric lighting at mental hospital. (See this issue.)

Walton and Weybridge.—October 16th. Electricity Department. 11,000-V feeder cables. (See this issue.)

Washington (Co. DURHAM).—October 14th. U.D.C. Twenty-eight electric-discharge street lamps on existing networks in the district. R. J. Swaddle, surveyor, Council Offices (deposit £1 1s.).

Whitburn.—Town Council. Electric lighting and power works at 200 houses. D. D. Sandeman, town clerk, National Bank Buildings, Bathgate.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Australia.—COMMONWEALTH.—P.M.G.'s Department. Accepted. Braided switchboard cable (£614).—British General Electric Co., Ltd. Submarine cable (£4,776) and automatic switching equipment and associated apparatus for Brunswick exchange (£22,245).—Siemens (Aust.) Pty., Ltd.
VICTORIA.—Victorian Railways. Accepted. Aerial telephone cable.—Johnson & Phillips, Ltd.
MELBOURNE.—City Council. Accepted. Metal-clad switchgear for installation in the switchroom at Spencer Street power house (£2,136).—A Reyrolle & Co., Ltd. Electricity meter parts.—Landis & Gyr, Ltd.—*Tenders.*

Bedford.—Electricity Committee. Recommended. Assisted-wiring installations, cooker wiring and water heater connections for twelve months.—Clarabut Radiolectric Service Co. Switchgear (£576).—British Thomson-Houston Co., Ltd. Cooker service installations in 136 houses at Stewartby Village (15s. per house).—Bedford Electrical Installation Co. Cooker control units for twelve months.—M.K. Electric, Ltd.

Blackpool.—Watch Committee. Accepted. Rewiring at the central police offices and Law Courts.—Simpsons, Lancaster.

Brighton.—Electricity Committee. Accepted. Instruments for No. 1 Stirling boiler (£745).—Allen West & Co., Ltd. H.p. cables and joint boxes for connecting alternators to switchgear (£791).—Siemens Bros. & Co., Ltd. Construction of ash trench, complete with hydro-jet transmission and pumping equipment (£3,185).—Ash Co. (London), Ltd. Telpher system for removal of ashes (£2,193).—Strachan & Henshaw, Ltd. Switchboard (£810).—Whitehead Switchgear, Ltd. Recording voltmeters (£313).—Elliott Bros. (London), Ltd. Meters—Ferranti, Ltd.
Tramways Committee. Accepted. Six sets of brake fittings (£104 per set).—Westinghouse Brake & Signal Co., Ltd.

Bristol.—Baths Committee. Recommended. Electric heating plant at Knowle baths (£6,266).—G. N. Haden & Sons, Ltd.
Assistance Committee. Accepted. Wireless installation at Eastville Institution (£219).—Electrolines, Ltd.

Cardiff.—Electricity Committee. Accepted. Lamps for free distribution to prepayment meter consumers.—Tungstallite, Ltd.; Vacuum Lamp Co., Ltd. Reconditioning and calibration of meters.—Metropolitan-Vickers Electrical Co., Ltd.

Chesterfield.—Electricity Committee. Accepted. Cables (£821).—Telegraph Construction & Maintenance Co., Ltd.

Croydon.—Public Assistance Committee. Accepted. Electrical fittings and appliances for six months.—Standard Wholesale Electrical Co.; Pryke & Palmer, Ltd.

Leeds.—Health Committee. Accepted. Rewiring at St. James' Hospital (£334).—F. H. Sowden, Ltd.
Electricity Committee. Accepted. L.p. switchgear (£2,400).—General Electric Co., Ltd. Re-blading turbine.—British Thomson-Houston Co., Ltd.
Transport Committee. Accepted. Battery charger for bus garage (£300).—Edison Swan Electric Co., Ltd.

London.—FULHAM.—Electricity Committee. Recommended. Auxiliary switchgear and connecting cables required at new generating station (£48,208).—Malcolm & Allan (London), Ltd. (Switchgear by A. Reyrolle & Co., Ltd., and cables by C.M.A.).
Accepted. Coal-conveying plant at generating station (£43,000).—Mitchell Engineering, Ltd. Auxiliary transformers at the new station (£10,401).—Metropolitan-Vickers Electrical Co., Ltd.
METROPOLITAN WATER BOARD.—Recommended. Internal telephones at the Board's head offices (£1,350).—Automatic Electric Co., Ltd.

Plymouth.—Electricity Committee. Accepted. One electrically propelled van (£248).—Morrison & Sons, Ltd. L.p. distribution boards.—W. T. Henley's Telegraph Works Co., Ltd. (£395); W. Lucy & Co., Ltd. (£112). One sub-station kiosk at Camel's Head (£673) and switchgear (£2,589).—Metropolitan-Vickers Electrical Co., Ltd.

Portsmouth.—Tramways Committee. Recommended. Seventy-six trolley buses (£1,059 each).—English Electric Co., Ltd. Overhead equipment (£19,619).—Clough Smith & Co., Ltd.

Smethwick.—Gas Committee. Accepted. Electrical distribution board.—Simplex Electric Co., Ltd. Cable.—Callender's Cable & Construction Co., Ltd.
Housing Committee. Accepted. Electrical installations at seventy-four Council houses.—Etna Lighting & Heating Co., Ltd.

Wolverhampton.—Electricity Committee. Accepted. Switchboard (£337) and 100-kVA transformer (£80).—Ferguson Pailin, Ltd.

Forthcoming Events

Bristol Electric Club.—Friday, October 11th. Royal Hotel, Bristol. 7.45 p.m. Address by Mr. A. J. Spurll.

Association of Mining Electrical Engineers (*South Wales Branch*).—Saturday, October 12th. South Wales Institute of Engineers, Cardiff. 6 p.m. Address by Mr. H. Williams.

Institute of Engineers in Charge.—Saturday, October 12th. Ladies' night.

Institution of Electrical Engineers (*Mersey and North Wales (Liverpool) Centre*).—Monday, October 14th. The University, Liverpool. 7 p.m. Address by Mr. O. C. Waygood. "The Engineering Problem in a Modern Store." (*Western Cetnre*).—Monday, October 14th. South Wales Institute of Engineers, Cardiff. 6 p.m. Address by Mr. H. Manley Roberts. (*North Midland Centre*).—Tuesday, October 15th. Hotel Metropole,

Leeds. 7 p.m. Address by Col. H. C. Fraser. (*Bristol Students' Section*).—Thursday, October 17th. Discussion on "The Old Engineer versus the New." (*South Midland Students' Section*).—Tuesday, October 15th. James Watt Memorial Institute, Birmingham. 7 p.m. Address by Mr. W. F. Baker. "Recent Developments in the Design of High Power Circuit-breakers." (*South Midland Centre*).—Wednesday, October 16th. Grand Hotel, Birmingham. 6.45 p.m. Address by Mr. F. H. Clough. (*North-Eastern Students' Section*).—Friday, October 18th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. Address by Mr. T. D. Oswald on "Lightning."

Institute of Transport.—Monday, October 14th. Institution of Electrical Engineers. London. 5.30 p.m. Presidential address by Sir C. Hurcomb.

Association of Supervising Electrical Engineers.—Tuesday, October 15th. E.L.M.A. Lighting Service Bureau, London. 7.15 p.m. Presidential address by Mr. H. Hobson. Saturday, October 19th. Criterion Restaurant, W.1. 6.30 p.m. Dinner and dance.

Electrical Association for Women (*London Branch*).—Wednesday, October 16th. 2.15 p.m. Visit to the Works of the Hewittic Electric Co., Ltd., and the Hackbridge Electric Construction Co., Ltd., Walton-on-Thames. (*Demonstrators' Circle*).—Monday, October 14th. 20, Regent Street, S.W.1. 7.30 p.m. Joint meeting with the Women's Engineering Society. "The Work of the International Federation of Business and Professional Women." Miss D. Heneker.

Birmingham Electric Club.—Friday, October 18th. Grand Hotel, Birmingham. 7 p.m. Ladies' night.

Institution of Mechanical Engineers.—Friday, October 18th. Annual dinner.

Electrical Power Engineers' Association (*Manchester Section*).—Saturday, October 19th. Grand Hotel, Manchester. 6 for 6.30 p.m. Annual dinner and dance.

Notes

Electrical Association for Women

The first conference of the Scottish Branch of the Electrical Association for Women will be held in Glasgow on October 25th and 26th. The proceedings will open in the afternoon with a public meeting in the Central Halls, when the speakers will include Lady Pentland, who will speak on "Electricity in Relation to Housing," Prof. J. R. Currie, who will give an address on "The All-Electric House," and Miss C. Haslett, whose subject will be "The E.A.W. and Housing." Miss M. G. Cowan will preside. A reception will be held in the evening in the Ca'dora, Glasgow. On the following morning visits will be paid to the all-electric show house of the Southern Building Co. at Kessington, Bearsden, a coal-electric bungalow at the premises of Messrs. Wylie & Lochhead, Buchanan Street, and the Housing and Health Exhibition at the Kelvin Hall. Luncheon will be taken at the Grosvenor, Gordon Street, at which Prof. S. Parker-Smith will be the principal speaker, Mrs. Liddell presiding, and in the afternoon there will be a business meeting and branch session over which Mrs. Aitken (Motherwell and Wishaw Branch) will preside.

To-day (Friday) at 4 p.m. Miss Caroline Haslett, director of the Electrical Association for Women, is to inaugurate a new Tunbridge Wells branch of the Association at the Tudor Café. Miss Weekes, the Mayoress of Tunbridge Wells, who is to be the first chairman of the branch, will preside, and Lady Callender has promised to speak. The secretary is Miss C. Hutt.

The view that the outlook of the Electrical Association for Women was "too practical and too near the ground" was expressed by Mr. J. C. Dalton, manager and secretary of the County of London Electric Supply Co., Ltd., at the second business-hour luncheon of the Association at the Criterion Restaurant, Piccadilly Circus, on Wednesday. Women, said Mr. Dalton, had found out early that electricity was vital for domestic purposes, and that the only problem was a cheap supply. They had aimed at freeing the housewife from household drudgery, but while continuing this excellent work could they not assist some of the harassed husbands in the industry? He considered that the E.A.W. should take every means in its power to obtain access to the recently appointed Government Committee on Distribution, since only women could emphasise the importance of the sale of electricity, which was a matter not for politicians but for good salesman. The provision of proper street-lighting too was a matter which might well be a special care of the E.A.W. Large housing schemes were demanding the influence of women, since a new technique was required for the future labour-saving home. The whole electrical industry wished success to the all-electric house which the Association was opening on October 23rd at Bristol.

A Batti-Wallahs' Luncheon

The first of the 1935-36 season's luncheons of the Batti-Wallahs' Society was held at the Hotel Metropole on Tuesday, when Sir Montague Hughman, the new president, occupied the chair. Mr. F. Gill, chairman of Standard Telephones & Cables, Ltd., the principal guest, in a short address, referred to certain incidents which had impressed him during his extensive travels abroad. These showed, he claimed, that British prestige stood high in foreign countries. Our financial structure was recognised as an extremely sound one, and our judicial system was held in great respect—largely because our Courts did not hesitate when necessary to give decisions against the Government. He maintained that British people had proved themselves to be level-headed, sensible and able to govern themselves without needing to be governed. At the conclusion of the address Mr. J. S. Highfield proposed a vote of thanks to Mr. Gill.

A New Electric-discharge Lamp

A demonstration of the "Philora" super-pressure mercury-vapour discharge lamp was given by Messrs. Philips Lamps, Ltd., at the Lighting Service Bureau on Wednesday. The lamp is water-cooled and the temperature may reach 8,000 deg. C. and the internal pressure 170 atm. The efficiency is about 60 lumens per watt, the spectrum is continuous (though uneven) and includes a large proportion of the red band. The most striking feature is its small size, a 600-W example being only 10 mm. in length and 6 mm. in external diameter.

A Frosted Lamp Patent Action

In the Chancery Division on October 8th Mr. Justice Farwell had before him a pending patent action brought by the British Thomson-Houston Co., Ltd., against Crompton Parkinson, Ltd., on a summons in which the defendants applied to re-amend their defence and counterclaim and the particulars of obections to the plaintiffs' action delivered with the defence. Mr. W. M. Heald, for the defendants, said that the action related to a process for frosting electric light bulbs and the claim in the plaintiffs' specification was in the widest possible terms. The action was for infringement of the plaintiffs' patent, and the defendants by their defence alleged that the plaintiffs' invention was not new by reason of prior user. They alleged that prior to the date of the plaintiffs' patent (February, 1925) frosted glass bulbs had been manufactured in Austria and imported into this country and that bulbs identical with the bulbs manufactured by the plaintiffs had been regularly made in this country. He submitted that the particulars of objection in question complied with the rules. Mr. Kenneth Swan, for the plaintiff company, submitted that the particulars of objection submitted by the defendants did not comply with the rules. What the defence had done was to set out a large variety of alternative processes leaving the plaintiffs to find out how many of these purely hypothetical processes they intended to rely upon. In giving judgment his Lordship said that in such a case as this where the defendants set up prior user great particularity with regard to the plea was required. The plaintiffs' claim was obviously made in very wide form and in all the circumstances he had come to the conclusion that he ought to accede that the defendants had complied with the rules.

Memorial to Sir Charles Parsons

After four years' work the engineering committee convened by the Royal Society to create a permanent memorial to the late Sir Charles A. Parsons still finds itself short of the desired funds. The scheme includes the erection of a tablet in Westminster Abbey and an annual lecture (with honorarium and commemorative bronze medal), for which £2,000 is needed. Also it is proposed to contribute £10,000 towards the construction of a technical research library in Dominion House. Moreover, a scholarship has been added, towards which over £2,000 has already been allocated. Owing to the depressed state of industry contributions have been smaller than they would have been in normal circumstances. Further details may be obtained from the Royal Society, Burlington House, Piccadilly, London, W.1.

Power Factor Correction

This is the subject of two booklets which have been issued by the Dubilier Condenser Co. (1925), Ltd., giving lucid and comprehensive information from both the technical and commercial aspects.

Competition for Craftsmen and Draughtsmen

The Physical Society announces that the seventh annual Craftsmanship and Draughtsmanship Competition will be held as usual in conjunction with its annual exhibition of scientific instruments and apparatus in January next. Competitors must be in the regular employ of a firm or institution which will be exhibiting or has exhibited at least once during the previous three years, and has been invited by the organising committee to enter its employés for the competition.

The Electrocution of Whales

In a report from Oslo it is stated that four Norwegian whalers owned by Messrs. Rosshavet will be equipped with special apparatus for the electrocution of whales, to be tried out during the forthcoming season.

Appointments Vacant

Electrical heating engineer for Hull Electricity Department.

Mains superintendent for Hazel Grove and Bramhall U.D.C.

Working foreman jointer for Hazel Grove and Bramhall U.D.C.

Lady cookery demonstrator and showroom attendant for Ealing Electricity Department.

(See our classified advertisements.)

Makers' Names Wanted

PEMBERTHY automatic cellar draining pump.

ATOLITE opal glass enclosed unit.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. C. G. Abbey, president of Bepco Canada, Ltd., sailed from Montreal on October 4th in the *Duchess of York*, accompanied by his wife and son. He is visiting the works of his constituent companies, Bruce Peebles & Co., Ltd., Crompton Parkinson, Ltd., the Harland Engineering Co., Ltd., and Lancashire Dynamo & Crypto, Ltd., and will be in this country for three or four weeks.

Mr. R. C. Norman, vice-chairman of the British Broadcasting Corporation, has been appointed to succeed the late Viscount Bridgeman as chairman of the B.B.C. for the remaining term of the present charter, which expires at the end of 1936.

Mr. E. R. T. Pink has resigned his position with the National Electric Supplies Co., Ltd. All communications to him should be addressed to 33, Elvendon Road, Bowes Park, N.13.

In connection with the non-contributory pension scheme which has just been inaugurated at the works of Brook Motors, Ltd., there was a presentation on October 2nd to the first three employés to retire under the scheme. The three employés, **Mr. A. Denton**, **Mr. E. Mills**, and **Mr. G. Milner**, had all completed more than fifteen years' service with the firm. Messrs. Mills and Denton were each presented with an electric clock and reading lamp, whilst Mr. Milner received a smoking cabinet. Another employé, Mr. David Kenworthy, was in the chair, and he thanked the directors for instituting the scheme. Other speeches were made by Messrs. J. L. Brook (general manager) and Mr. F. V. Brook (director). Miss Annie Saville, charge-hand of the girls, made the presentation.

Mr. H. N. Green has been awarded the Leon Gaster Memorial Premium by the Illuminating Engineering Society for his paper on "Recent Developments in Airway and Aerodrome Lighting." For the encouragement of younger members, the Society has created the Silver Jubilee Commemoration (1934) Award, open to members or affiliated students under twenty-six years of age; this has been awarded to **Mr. R. Hopkinson** for a contribution entitled "The Photographic Representation of Street Lighting Installations."

Mr. J. A. Woods, A.M.I.E.E., Atlas Chambers, 88, Westgate Road, Newcastle-on-Tyne, 1, has been appointed by Messrs. Evershed & Vignoles, Ltd., as their Northern Counties representative, in place of Mr. Hanks, who is retiring, and will carry on this representation in conjunction with the agencies he already holds. Mr. Hanks, who will co-operate with Mr. Woods until the end of the year, has represented Messrs. Evershed & Vignoles for thirty years, and while relinquishing their representation will continue his consulting and scientific practice.

Mr. L. E. Jones has resigned from the board of Holophane, Ltd.

Mr. H. H. Denton, who has retired from the position of borough electrical engineer at Crewe, was recently presented with an electric clock from the staff of the Electricity Department. Presentations were also made to Messrs. W. Clutton, T. Rogers, and J. Younger, who have also retired from the staff.

Mr. R. Randall, who has for some years been in the Installation Department at the Ilford Corporation electricity works, is leaving to take up an appointment in the Engineering Department at New Scotland Yard, and on September 28th he was entertained by his colleagues to a supper and social gathering. Mr. H. Statham, consumers' engineer, presided, and a presentation was made to Mr. Randall during the evening.

Mr. E. A. Logan, engineer to the Mid-Cumberland Electricity Co., Ltd., has been appointed deputy electrical engineer by the Erith Urban District Council.

Mr. F. T. Emery, of the Burton-on-Trent Corporation electricity works staff, who was recently married to Miss Norah Arnold, has been presented by his colleagues with a canteen of cutlery.

Mr. W. Booth, for fourteen years chief engineer to the Portadown Electric Co., Ltd., has been appointed electrical engineer to Messrs. W. and G. T. Pollexfen & Co., Ltd., Avena Flour Mills, Ballisadare, Co. Sligo, Irish Free State.

Mr. S. G. Gates has resigned from the board of the Southern Areas Electric Corporation and from the boards of its subsidiaries.

Mr. F. M. Morris has been elected vice-chairman and managing director of Messrs. Herbert Morris, Ltd. **Messrs. G. Macbriar** and **H. G. Purnell** have been elected directors.

Mr. J. G. Brennan has been appointed chief superintendent of telegraphy at the Liverpool Headquarters Post Office.

Mr. L. A. Booth, formerly London branch manager of Johnson & Phillips, Ltd., has severed his connection with the company.

Mr. G. F. Bedford, B.Sc., late of the rectifier section of Messrs. Philips Industrial, has been appointed London manager of Messrs. Partridge, Wilson & Co., Ltd. He will be in direct control of all the company's activities at its London offices, Shaftesbury Avenue, which is the London centre of both Wilson Electric and Davenset sales and service. In addition to Wilson electric vehicles, a new section at the London office, under the supervision of Mr. K. Hartridge, deals with Davenset battery-charging valve rectifiers and mains components.

Mr. C. C. Bleach, for the past fourteen years chief electrical engineer to the Doncaster Collieries' Association, has taken up a position with the Yorkshire Electric Power Co., and his assistant, **Mr. W. T. Barrow**, has been appointed to succeed him. A presentation has been made to Mr. Bleach by the general manager, Mr. J. Criddle, on behalf of the officials and staff. Mr. Barrow served his apprenticeship with Messrs. A. Reyrolle & Co., Ltd. Subsequently he was with the Newcastle Electric Supply Co., the Glasgow Corporation, and various collieries in connection with the installation of Reyrolle switchgear.

Miss Gladys F. Sharp, daughter of Mr. E. E. Sharp (Venner Time Switches, Ltd.), is sailing on the s.s. *Rangitata* from London on October 17th, for an extended tour of New Zealand and Australia. She will carry with her the good wishes of many friends in E.A.W. circles.

Mr. A. E. Tutty, of Tutty & Payne, Ltd., Kettering, has been elected chairman of the Electrical Section of the Ironmongers' Federated Association.

At the E.P.E.A. Dinner **(See page 503)**

Left: Mr. C. Morley New (Junr.), Mr. and Mrs. C. G. Morley New. Right: Mr. and Mrs. A. E. McKenzie, and Mr. and Mrs. W. J. Oswald (Wimbledon).

Bailie J. M. Bryce, of Kilmarnock, was appointed chairman of the Ayrshire Electricity Board at a meeting held on October 4th, in succession to the late Bailie R. Scott, and **Mr. T. Murray**, of Ayr, was appointed vice-chairman. **Provost H. Smith**, of Kilmarnock, was appointed convener of the Finance Committee, and Police Judge **H. Hopperton**, of Ardrossan, convener of the Engineering Committee.

Mr. J. F. McMullen, A.M.I.E.E., a former Post Office engineer at Cardiff for twenty-four years, and who left Cardiff in 1926 to become engineer in charge at Southampton, has just retired. Mr. McMullen has spent forty-four years in the Post Office service and played an important part in the taking over of the National Telephone Co. system in South Wales.

Mr. J. S. Duncan has been appointed deputy director of Posts and Telegraphs in the State of New South Wales, in succession to Mr. J. W. Kitto, who has retired. Mr. Duncan entered the State public service in 1903, and left in 1923 to join the Commonwealth public service, and at the time of his new appointment he held the position of senior public service inspector.

Obituary

We regret to learn that the mother and sister of **Mr. H. N. Sporborg**, of Elmhurst, Rugby, director and chief engineer of the British Thomson-Houston Co., Ltd., were killed as

the result of an accident on October 3rd in North Carolina, U.S.A.

Mr. J. Peech.—Mr. James Peech, who died on Monday, aged sixty-two, was a son of Mr. William Peech, the founder of Steel, Peech & Tozer. He was a director of United Steel Companies.

Mr. T. Ely.—The death is announced in *The Times* of Mr. Talfourd Ely, A.M.I.E.E., which occurred on September 30th, at Richmond, at the age of sixty-eight. Mr. Ely was a director and manager, engineer and secretary of the Ross Electric Light & Power Co., Ltd.

Wills.—**Mr. F. C. Crawley,** late director of the City of Buenos Aires Tramways Co. (1904), Ltd., left £4,262 (net personalty £4,218).

Sir Basil P. Blackett, a director of Cable & Wireless, Ltd., Marconi's Wireless Telegraph Co., Ltd., and other companies, left £43,632, with net personalty £27,561.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Amalgamated Electrical & Lighting Equipment Co., Ltd.—Public company. Registered September 30th. Nominal capital, £100,000 in £1 shares. The objects are to carry on the business of electricians, mechanical engineers, manufacturers of and dealers in electricity, motive power and light, apparatus and appliances connected therewith, wireless sets and accessories, dynamos, motors, armatures, magnetos, batteries, cookers, insulating materials and general electrical plant, railway locomotives, wagons, tramcars, &c. The subscribers are: M. A. Tarlo, 6, Grange House, Church Street, London, N.16, L. Tarlo, 119/120, London Wall, E.C., and five others. Solicitors: Tarlo & Co., 119/120, London Wall, E.C.

Century Power and Light, Ltd.—Public company. Registered October 2nd. Nominal capital, £100 in 10s. shares. Objects: To acquire and hold shares, stocks, debentures, debenture stocks, bonds, obligations and securities, to produce, supply, store, distribute and deal in electricity, coal or other gas, and other means of heating, lighting or power, &c. The subscribers are: E. C. Brydges, 18, Austin Friars, E.C.2, and six others. The directors' borrowing powers are restricted to £3,000,000. Solicitors: Slaughter & May, 18, Austin Friars, E.C.

British Automatic Refrigerators, Ltd.—Public company. Registered September 30th. Nominal capital, £40,000 in 400,000 ordinary shares of 2s. Objects: To acquire the business now carried on by the British Automatic Refrigerators, Ltd., and to carry on the business of mechanical engineers and manufacturers of all kinds of plant, machinery, implements, &c., and manufacturers, importers and exporters of and dealers in all articles of domestic or commercial use, including refrigerators and iceboxes, &c. The directors are: L. S. Swinnerton Dyer, Westhope Cottage, Craven Arms, Shropshire, Lt. Comdr. E. W. Billyard-Leake, D.S.O., R.N., Stanley Old Hall, Bridgnorth, Salop, and H. I. Brackenbury, C.B.E., Tweedhill, Berwick-on-Tweed. Registered office: Masborough Street, Rotherham.

Onward Manufacturing Co., Ltd.—Private company. Registered October 4th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in insulating and impregnated materials of all kinds, &c. The directors are: J. I. Inman-Emery, 19, Queen's Gate, London, S.W.7, and two others.

Alex Signs, Ltd.—Private company. Registered October 4th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in machinery, engines, motors, electrical and other signs, reflectors, lamps, apparatus and appliances for illumination and advertising of all kinds, &c. The subscribers are: S. Carlton, 15, King Edwards Road, Ponders End, Enfield, and W. G. Mason, 51, Warneford Street, Hackney, E.9. R. Stanbois is first and permanent director. Solicitors: S. Rutter & Co., 1/2, Great Winchester Street, E.C.

Willans & Robinson, Ltd.—Private company. Registered October 3rd. Nominal capital, £100 in £1 shares. Objects: To carry on the business of electrical, mechanical, hydraulic, gas, mining and general engineers, makers, storers, distributors and suppliers of electricity, gas, steam, water or other power, contractors, boiler makers, founders, launch and ship builders, &c. The subscribers are: G. S. Anderson, Crescent Court, West Cromwell Road, Kensington, S.W.; and J. E. Williams, 78, Rosemary Avenue, Finchley, N.3. Registered office: Queen's House, Kingsway, W.C.2.

E. H. Milner, Ltd.—Private company. Registered October 5th. Capital, £1,500 in £1 shares. Objects: To acquire the business of electrical engineer now carried on by Edward H. Milner at High Wycombe, Bucks. The first directors are: E. H. Milner and A. C. Milner, both of 171, West Wycombe Road, High Wycombe, Bucks. Registered office: 47, Oxford Road, High Wycombe, Bucks.

Heala, Ltd.—Private company. Registered October 5th. Capital, £100 in 1s. shares (1,200 "A" and 800 "B"). Objects: To acquire the business of sole distributors in the U.K. and Northern Ireland of the "Heala Ray" apparatus, "Heala" lamps, "Heala Vitalux" bulbs, &c. The first directors are: W. Herbert, "Crosslands," Southend Road, Beckenham, and one other. Registered office: "Rayspa," 32, Southend Road, Beckenham, Kent.

London Wire Co., Ltd.—Private company. Registered October 2nd. Capital, £7,500 in £1 shares. Objects: To carry on the business of wire rod, wire and wire goods manufacturers and dealers, &c. The directors are: L. N. Mills, "Kingswood," Walton-on-Thames, and two others. Registered office: Archdale Works, St. John's Road, New Malden.

Western Neon Signs, Ltd.—Private company. Registered September 30th. Capital, £1,000 in £1 shares. Objects: To carry on the business of sign makers and fixers, manufacturers of neon apparatus, for signs, lighting or any other purpose, display lighting and shop fitters, electrical contractors, manufacturers of electrical equipment or lighting apparatus, advertising agents, &c. The directors are: C. A. R. Stinson, "The Rockies," North Road, Bath, and two others. Secretary: W. H. Sheppard, 47, Milsom Street, Bath. Registered office: 29, Wells Road, Bath.

J. E. Creasey, Ltd.—Private company. Registered October 2nd. Capital, £500 in £1 shares. Objects: To carry on the business of wireless, television and electrical engineers and retailers. The life directors are: J. E. Creasey and E. Creasey, both of 58, Hinckley Road, Leicester. Secretary: A. A. Baseley. Registered office: Burlington House, 53a, London Road, Leicester.

Returns of Electrical Companies

British Sangamo Co., Ltd.—The nominal capital has been increased by the addition of £90,000 beyond the registered capital of £60,000. The additional capital is divided into 180,000 ordinary shares of 10s. each. Each of the 60,000 shares of £1 in the original capital has been subdivided into 2 shares of 10s. each. The company has now been converted into a public company. The Sangamo Electric Co., of Springfield, Ill., U.S.A., held 41,978 shares out of 59,805 issued to April 4th, 1935.

Regentone Products, Ltd.—Mortgage on all book debts and sums of money owing or to become owing to the company, in respect of its business, dated September 3rd, 1935, to secure £1,000 and further advances amounting therewith to £3,300. Holder: T. L. Jacks, 1, Great Cumberland Place, W.1.

Ubique Welding Co., Ltd.—Issue on September 23rd, 1935, of £1,000 second debentures, part of a series already registered.

Visco Engineering Co., Ltd.—First mortgage debenture, dated September 27th, 1935, to secure £9,000, charged on factory and land at Stafford Road, Croydon, and the company's other assets, including uncalled and unpaid capital. Holders: Westminster Bank, Ltd.

Western Electric Co., Ltd.—Capital, £20,000 in £1 shares. Return dated April 8th, 1935. All shares taken up. £20,000 paid. Mortgages and charges, nil.

West Gloucestershire Power Co., Ltd.—Capital, £685,000 in £450,000 6½ per cent. participating preference stock and £235,000 ordinary stock. Return dated April 5th, 1935. All stock taken up. £450,500 paid on £450,000 preference stock and £500 ordinary stock. £234,500 considered as paid on £234,500 ordinary stock. Mortgages and charges, £550,000.

Newmarket Electric Light Co., Ltd.—Capital, £30,000 in £10 shares. Return dated April 2nd, 1935. 2,656 shares taken up. £26,560 paid. Mortgages and charges, £14,200.

Union Cable Co., Ltd.—Capital, £100,000 in £1 shares. Return dated April 25th, 1935. All shares taken up. £75,000 paid (£1 on 50,000 and 10s. on 50,000). Mortgages and charges, nil.

J. H. Holmes & Co., Ltd.—Capital, £100,000 in £1 shares. Return dated April 18th, 1935. 50,000 shares taken up. £50,000 paid. Mortgages and charges, nil.

Cary, Hallewell & Co., Ltd.—Capital, £2,500 in £1 shares. Return dated April 5th, 1935. 1,250 shares taken up. £1,250 paid. Mortgages and charges, £100.

Whitecroft Instrument Co., Ltd.—Capital, £1,000 in £1 shares. Return dated April 29th, 1935. 150 shares taken up. £100 paid. £50 considered as paid. Mortgages and charges, nil.

Pirelli, Ltd.—Mortgage on properties, &c., in Burton-on-Trent, Stretton (Staffs) and London, dated September 26th, 1935, to secure £150,000. Holders: Friends' Provident and Century Life Office, 7, Leadenhall Street, London, E.C.

Vee Cee Dry Cell Co. (1927), Ltd.—Satisfaction (1) to the extent of £1,000 on August 27th, 1935, of debentures authorised June 28th, 1932, and registered July 1st, 1932, and (2) to the extent of £1,000 on September 10th, 1935, of debentures authorised May 3rd, 1934, and registered May 4th, 1934.

Melbourne Electric Supply Co., Ltd.—Satisfaction in full on (1) August 29th, 1935, of trust deed dated September 26th, 1901, and deeds supplemental thereto, two dated March 31st, 1903, and one dated May 4th, 1909, and registered October 4th, 1901, April 17th, 1903, and May 7th, 1909, respectively, (2) August 30th, 1935, of trust deed dated March 7th, 1913, and registered March 12th, 1913, and (3) on same date of trust deed dated January 31st, 1922, and supplemental deed dated February 5th, 1923, and registered February 7th, 1922, and February 16th, 1923, respectively.

Keswick Electric Light Co., Ltd.—Capital, £20,000 in 5,000 preference and 15,000 ordinary shares of £1. Return dated April 11th, 1935. 4,000 preference and 15,000 ordinary shares taken up. £13,000 paid on 13,000 ordinary shares, £6,000 considered as paid on 4,000 preference and 2,000 ordinary shares. Mortgages and charges, nil.

Geo. Bray & Co., Ltd.—Capital, £160,000 in 80,000 preference and 80,000 ordinary shares of £1. Return dated April 9th, 1935. 55,000 preference and 55,000 ordinary shares taken up. £7 paid, £109,993 considered as paid. Mortgages and charges: £40,000.

Newcastle & District Electric Lighting Co., Ltd.—Capital, £600,000 in £1 shares. Return dated April 9th, 1935. All shares taken up. £600,000 paid. Mortgages and charges: £150,000.

Chiswick Electricity Supply Corporation, Ltd.—Capital, £250,000 in £1 shares. Return dated April 25th, 1935. All shares taken up. £250,000 paid. Mortgages and charges, nil.

Windermere & District Electricity Supply Co., Ltd.—Capital, £75,000 in 5,000 cumulative preference, 5,000 preference and 5,000 ordinary shares, all of £5 each. Return dated April 11th, 1935. 5,000 cumulative preference, 4,000 preference, and 4,340 ordinary shares taken up. £23,850 paid on 3,040 cumulative preference and 1,730 ordinary shares, £42,850 considered as paid on 1,960 cumulative preference, 4,000 preference, and 2,610 ordinary shares. Mortgages and charges, nil.

A. Reyrolle & Co., Ltd.—Capital, £700,000 in 115,000 preference and 585,000 ordinary shares of £1. Return dated April 18th, 1935. 102,500 preference and 585,000 ordinary shares taken up. £680,500 paid on 102,500 preference and 578,000 ordinary shares, £7,000 considered as paid on 7,000 ordinary shares. Mortgages and charges, nil.

Cables Investment Trust, Ltd.—Particulars have been filed of debenture stock to secure £3,000,000, with premium of 1 per cent. on redemption, authorised July 16th, 1935, and covered by trust deed dated September 24th, 1935. The whole amount is now issued. The stock constitutes a floating charge over the company's undertaking and property, present and future, including uncalled capital. The company may create fixed or floating charges on all or any of the mortgaged premises, in favour of bankers or others, ranking in priority to or *pari passu* with this charge, to secure to principal sums not exceeding £500,000 at any one time outstanding. The trustees are the Earl of Midleton, Peper Harow, Godalming, and Baron Inverforth, The Hill, Hampstead, London, N.W. (The stock was issued at 99 per cent. An underwriting commission of 1 per cent. and an over-riding commission of ¼ per cent. was paid on the nominal amount of stock).

Electric and Ordnance Accessories Co., Ltd.—Capital, £50,000 in £1 shares. Return dated April 1st, 1935. 45,002 shares taken up. £2 paid, £45,000 considered as paid. Mortgages and charges, nil.

London Magneto Repairing & Winding Co., Ltd.—Christopher Waller, of 27, Fitzroy Square, London, W.1, was appointed receiver on September 30th, 1935, under powers contained in debentures dated November 24th, 1922, and June 27th, 1924.

W. G. Hodgson, Ltd.—Capital, £1,000 in £1 shares. Return dated April 24th, 1935. 800 shares taken up. £400 paid. £400 considered as paid. Mortgages and charges, nil.

Premier Electric Welding Co. (Newcastle), Ltd.—Satisfaction on January 21st, 1933, of mortgage registered October 13th, 1928. Notice filed September 26th, 1935. (According to the register of mortgages the mortgage registered October 13th, 1928, orginally secured all moneys due to bank, not exceeding £2,500.)

St. James's Electrical Co., Ltd.—Equitable mortgage on debt or sum of £318 dated September 6th, 1935, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

Bork & Ynylas Electric Supply Co., Ltd.—Capital, £7,000 in £1 shares. Return dated April 13th, 1935. 4,280 shares taken up. £4,255 paid, £25 calls unpaid. Mortgages and charges: £1,700.

W. H. A. Robertson & Co., Ltd.—Capital, £36,000 in 600 ordinary and 3,000 preference shares of £10. Return dated April 3rd, 1935. 600 ordinary and 2,180 preference shares taken up. £25,650 paid, being £5 per share on 430 preference and £10 per share on 1,750 preference and 600 ordinary shares. Mortgages and charges, nil.

Monks & Byrne, Ltd.—Capital, £2,500 in £1 shares. Return dated April 20th, 1934 (filed April 4th, 1935). 2,000 shares taken up. £1,350 paid, £650 considered as paid. Mortgages and charges, nil.

City Notes

Murex, Ltd., reports a trading profit of £190,391 for the year ended June 30th last as compared with £123,867 in the preceding year, to which are added dividends and interest received, &c., making a total of £229,393. The net profit is £210,260, in addition to which £14,000 is credited, being a refund by Murex Welding Processes, Ltd., of that company's proportion of the allocation to the staff pension fund. A final dividend of 10 per cent. is proposed, making 20 per cent. for the year on the ordinary shares and £77,730 is carried forward. It is proposed to increase the share capital to £650,000 by the creation of 60,000 new ordinary shares of £1 each, and to capitalise £13,500 of the general reserve for distribution rateably as a bonus among the shareholders in the proportion of one £1 ordinary share for every forty shares held. These bonus shares will rank for dividend as from July 1st last.

The London Passenger Transport Board announces that further payments on account of interest on London Transport "C" stock will be made on October 31st to all holders at the rate of ½ per cent., less tax, in respect of the year ended June 30th, 1934, and at the rate of 2½ per cent., less tax, for the year ended June 30th last. The Board will shortly transmit to the Minister of Transport the reports and copies of the statements of accounts and statistics and of the auditors' reports for the years ended June 30th, 1934 and 1935. Copies of the documents will be on sale (price 1s. each) at the offices of the Board on October 31st.

The Calcutta Electric Supply Corporation, Ltd., proposes to put in hand a big development programme which will call for the provision of a considerable amount of new capital, and it has decided to issue to ordinary shareholders 179,830 ordinary shares of £1 at £2 5s. each in the proportion of one new share for every ten held. Acceptances must be sent on or before October 15th, an extension of time being allowed for holders of ordinary shares whose registered addresses are outside Europe.

Tube Investments, Ltd., recommends the payment of a dividend of 10 per cent., less tax (same) on ordinary shares for the year ending October 31st, with a relative rate on the liaison ordinary. A resolution is to be submitted at the annual meeting on December 4th for the capitalisation of a sufficient part of the reserve funds to permit of the distribution among holders of ordinary and liaison ordinary shares respectively of fully paid ordinary shares of £1 each at the rate of one for every ten held. A similar distribution was made a year ago.

Companies to be Struck off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary: Barnetts Electrical Supply Co., Ltd.; Golden Voice Radio, Ltd.; Hughes Electric Supplies, Ltd.; "K" Television Demonstrations, Ltd.; Oates Electrical Components, Ltd.; Swan Radio, Ltd.

The Tata Power Co. reports a gross revenue for the year ended June 30th last of Rs.74,42,885, as compared with Rs.61,28,977 in the preceding year, and a net profit of Rs.27,74,247, as against Rs.19,83,160. The final ordinary dividend is Rs.40 per share, tax free, making Rs.55 for the year (against Rs.30). The amount carried forward is Rs.3,18,435.

The Tata Hydro-Electric Power Co. reports net profits for the year ended June 30th last of Rs.88,606. The final ordinary dividend is Rs.4-3-0 per share, making Rs.7-8-0, and in addition a Jubilee bonus of Rs.1 is to be paid.

The Andhra Valley Power Co. reports net profits of Rs.8,19,358 for the year ended June 30th last. A final ordinary dividend of Rs.45 is paid, making Rs.75 for the year (same), and Rs.4,83,706 is carried forward.

Joseph Lucas, Ltd., reports net profits for the year ended August 7th last of £263,668, as compared with £257,382 in the preceding year. Reserve receives £56,007, raising it to £500,000, and the ordinary dividend is maintained at 12½ per cent., less tax, leaving £74,377 to be carried forward.

The Shanghai Electric Construction Co., Ltd., has declared an interim dividend of 4 per cent. (unchanged).

The Calcutta Tramways Co., Ltd., has announced an interim ordinary dividend of 3½ per cent., less tax (same).

Stocks and Shares

TUESDAY EVENING.

MARKETS in the Stock Exchange have recovered a certain amount of confidence and reassurance, owing to the generally held impression that the League of Nations will take no drastic step in the direction of applying military sanctions, whatever they may do in the other areas to which this particular Covenant applies. There has been a marked recovery in prices from the lowest levels recently touched. The Continental selling of gilt-edged securities, which was an unpleasant feature towards the end of last month, has ceased, and a good deal of the stock which went into temporary hands has found a more permanent home. Difficulty is still experienced in finding stocks that fulfil the desired qualifications of being suitable for preservation of capital and of affording a reasonable rate of income. A few falls have occurred in the quotations of stocks in the electricity boards.

London Transport Dividend

Expectation had been looking for a possible 4½ to 5 per cent. dividend on London Transport C stock for the year 1934-35. The Board has announced a final payment of 2½ per cent. for the year ended June 30th last, and an extra ½ per cent. in respect of the previous year. This makes 4 per cent. for the year lately concluded, and raises the previously paid 3 per cent., distributed thirteen months ago, to 3½ per cent. At the present price, therefore, the yield on the money is £4 3s. 4d. per cent., the price being 96 ex 60s. less tax. The dividend is to be paid on October 31st. Although the effect of the announcement has been to give rise to a certain amount of mild disappointment, it may be remarked that a 4 per cent. dividend on a stock of this description is by no means a bad showing. Under the Act, this C stock can receive up to 6½ per cent. if earnings should warrant it. Londoners know well enough that there is no falling off in the demand for transport facilities. The traffics of the Board show continual increases, and prospects suggest a 5 per cent. dividend in the none-too-distant future. There are, of course, other factors which enter into the position, and these give the stock its speculative flavour.

Electricity Supply Shares

The list of ordinary shares in the home electricity supply companies shows a few falls that range from sixpence to a shilling. The declines are mostly in the nature of adjustments of the prices to levels occupied by similar stocks and shares as regards yields on the money. Metropolitan Electric ordinary shares at 50s. pay 4 per cent., and Edmundson's give a similar return at £2. The ordinary shares of the London Associated Electricity, which rose 1s. 9d. last week, have reacted a trifle to 33s., at which the yield, assuming a 7 per cent. standard rate of maintenance, will be 4¼ per cent. on the money. Clyde Valley shares have gone back to 40s. Lancashire Electric and other provincial shares maintain their

previous prices. It is stated that the Lancashire Electric Power Co. has placed 46,975 ordinary shares of £1 each. Out of the issue of 369,000 new shares that was made last June at 30s. each, 15,975 were not taken up by the holders. These shares, together with 31,000 other unissued shares, make up the total just mentioned.

Claim Your Rights

The matter is one of interest in illustrating the argument, often set out here, to the effect that many shareholders, particularly those who are unaccustomed to regular Stock Exchange dealings, fail to take advantage of offers made of New shares at bonus prices. The mere fact of a shareholder being asked to put up more money is sufficient to indicate the wastepaper basket as the destination of the offer of a new issue. If shareholders would only consult their Stock Exchange brokers, they would quite often find that they could sell new shares at a profit, if they prefer not to subscribe fresh capital.

Cable and Wireless

The generally improved tone which set in at the beginning of this week in most of the markets, brought about a sharp revulsion of feeling in Cable and Wireless stocks. The 7½ per cent. A ordinary had been down to 21½, but rallied to 23, which leaves the price unchanged on the week. The preference has regained 3 points of its recent fall. The B ordinary, which is, of course, no more than a gambling counter, is ¼ lower at 6½. Globe Telegraph & Trust ordinary shares at 12¾ are also 5s. down. No change has been made in the preference at 13½, at which price the yield on the money is nearly 4¼ per cent. Great Northern Telegraphs at 39 are down £1. Cables Investment Trust preference shares and debenture stock are quoted at 10½ and 99 respectively, the former being 7s. 6d. up on the week. Of the American group, American Telephone & Telegraph shares at 138½ show a fall of 5 points, more than wiping out the recent improvement in the shares. American utilities are a quiet market for the moment. The United States speculators have lately concentrated a good deal of attention upon stocks in companies which stand to benefit from the war.

Manufacturing and Equipment

Siemens at 22s. 6d. have receded 1/16, but Telegraph Constructions retain the improvement to 23s. 9d. which followed upon the notification that the two companies have arrived at an amalgamation of the gutta percha submarine cable business of both. Cable Manufacturing sales are steady with Callender's a feature of strength at 73s. 9d. Crompton Parkinson ordinary are an active market, revolving round 70s., to the accompaniment of a number of rumours equally variable and nebulous. That there must be something very satisfactory to come, and before long, is obvious from the fact that at the present price Cromptons pay less than one per cent. on the money. Ericssons are quoted in their divided form, at 30s. English Electric shares have both reacted, and Associated Electrical ordinary at 34s. show a fall of sixpence. Ever Ready shares at 22s. are also easier. Of the shares in the "heavy" industries, Babcock & Wilcox advanced 2s. 6d. to 51s. 3d. An enormous business has been transacted this week in iron and steel shares, public attention having been attracted by the anticipation that there will shortly be announced a comprehensive programme of re-armament. Vickers shares of 6s. 8d. each, rose to 20s., as against the lowest this year of 8s. 9d. The top prices have not been maintained, but the market keeps very hard.

Stocks and Shares Wanted

Particulars have been given here on many previous occasions of stock and shares on offer in the market, and available for investment. Also, it has been pointed out, possibly ad nauseam, that the supplies of floating stock are comparatively meagre. By way of complement to the first of these two considerations, it may be of service to mention that there are buyers in the market at good prices of electric lighting preference shares and debenture stocks. The following comprehensive list of securities wanted, and the prices actually bid, gives an indication of the ease with which sound stock and shares can be placed, and the high figures obtainable at the present time, in spite of the fall that has lately occurred in War Loan and other British Government stocks.

PREFERENCE.	Div.	
City of London	8	38/6
Clyde Valley	6	32/–
Edmundsons	6	29/–
Electric Supply	6	30/6
Llanelly and Dist.	6	28/3
London Assoc. Elec.	4½	23/9
London	6	7⅞
Mersey Power	6	29/–
West Gloucestershire	6½	125
DEBENTURE.		
Bournemouth and Poole	3½	103
County of London	5	124½
Galloway Water Power	5	107½
Lincolnshire	4	106
London Power	5	108
North Eastern	5	107
do.	3½	102
West Gloucestershire	4	101
Yorkshire Elec.	3½	101½

In each of these cases, a seller can rely upon placing a fair amount at the prices given.

Share List of Electrical Companies

	Nom.	Dividend 1933.	Dividend 1934.	Price Oct. 8.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	3¾	—	3 17 5
City of London	1	7½	7½	37/–	–6d.	4 1 0
Clyde Valley	1	7	8	41/–	–1/–	4 0 0
County of London	1	10½	10½	53/–	–6d.	3 19 3
Edmundson's 7% Pref.	1	7	7	35/–	—	4 0 0
Do. Ord.	1	7	8	40/–	–1/–	4 0 0
Elec. Dis. Yorkshire	1	9	9	46/–	–6d.	3 18 3
Elec. Fin. and Securities	1	12½	12½	5¾	—	3 14 2
Elec. Supply Corporation	1	11	11	3 1/16	—	3 11 10
Lancs Light and Power	1	7½	7½	36/–	—	4 3 6
Lond. Assoc. Electric	1	—	—	33/–	–9d.	4 5 0
London Electric	1	7	8	38/6	—	4 3 0
London Power deb. Red.	Stock	5	5	108½	—	4 12 4
Metropolitan	1	10	10	50/–	–1/–	4 0 0
Midland Counties	1	7	7	35/6	—	3 19 0
Mid. Elec. Power	1	8	8	40/9	—	3 18 6
North Eastern Electric Ordinary	1	6	6	32/0	—	3 15 0
Do. 7% Pref.	1	7	7	34/–	—	4 2 2
Northampton	1	10	10	50/–	—	4 0 0
Notting Hill 6% Pref.	10	6	6	14½	—	4 2 9
North Met. Elec. Ordinary	1	10	10	57/6	—	3 9 5
Do. do. 6% Pref.	1	6	6	31/6	—	3 16 2
Scottish Power	1	8	8	39/–	—	4 2 0
South London	1	7	7	33/6	—	4 3 7
Whitehall Elec. Invst. 7¼% Pref.	1	7½	7½	22/6	–1/–	6 13 4
Yorkshire Elec.	1	8	8	42/6	—	3 15 5
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	114	–1	4 7 9
Do. 1955–75	,,	5	5	117	—	4 5 6
Do. 1951–73	,,	4½	4½	110	—	4 1 10
Do. 1963–93	,,	—	3½	102	—	3 8 6
London Elec. Trans. Gtd.	,,	—	2½	94	–1	2 13 2
London & Home Counties, 1955–75	,,	4½	4½	114	—	3 19 0
London Passenger Transport, A.	,,	—	4½	120½	–2	3 14 8
Do. do. B.	,,	—	5	125½	–1	3 19 8
Do. do. C.	,,	3½	4	98xd	—	4 3 4
West Midlands Joint Elec. 1948–68	,,	—	5	115	—	4 7 0
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$100	9	9	138½	–5	6 10 0
Anglo-Am. Tel. Pref.	Stock	6	6	116	—	5 3 0
Do. Def.	,,	1½	1½	27½	—	5 9 1
Cable & Wireless 5½% Pref.	,,	2¾	4½	98½	+3	4 4 7
Do. A. 7½% Ord.	,,	Nil	Nil	23	—	—
Do. B. Ord.	,,	Nil	Nil	6½	–½	—
Globe Tel. & Tel. Ord.	10	2½	3½*	12¾	–¼	2 15 0
Do. do. Pref.	10	6	6	13½	—	4 9 0
Great Northern Tel.	10	20	20	39	–1	5 2 7
Marconi-Marine	1	10	7½	30/9xd	—	4 17 5
Oriental Telephone Ord.	1	12	12	3 1/16	–¼	*3 18
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	1050	—	—
Do. do. Pref. Ord.	,,	8	8	170	—	4 14 2
Brazil Traction	100	—	—	7½	—	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	98½	—	5 1 6
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	$500	5	5	35	—	—
Victoria Falls Ord.	1	20	20	3 1/16	–1/16	—
West Riding	1	5	6½	40/9	–1/16	3 4 0
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	10	15	53/9	–5/–	5 11 6
Assoc. Elec. Ord.	1	4	6	34/–	–6d.	3 10 7
Do. Pref.	1	8	8	37/–	–6d.	4 6 4
Babcock & Wilcox	1	6	8	51/3	+½	3 2 4
British Aluminium Ord.	1	5	7½	41/6	+9d.	3 12 4
British Insulated Ord.	1	5	15	4¾	—	3 8 8
Brush Ord.	Stock	Nil	Nil	42½	–4	—
Callender's	1	15	15	3 1/16	+1/16	4 1 4
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/–	—	12½	3½	—	0 17 10
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Edison Swan 1st Pref.	1	7½	7½	27/6	—	5 9 0
Electric Construction	1	Nil	3½	24/3	—	2 17 9
Enfield Cable Ord.	1	25	25	4½	–1/16	5 2 6
English Electric	1	Nil	Nil	16/3	–9d.	—
Do. do. Pref.	1	Nil	Nil	22/–	–6d.	—
Ericssons Tel.	5/–	—	24	30/–+b	—	—
Ever Ready	5/–	35	35	22/–	–6d.	7 19 1
Ferranti Pref.	1	7	7	27/6	–6d.	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	10	3½	—	3 4 0
Henley's	1	30	20	6½	–1/16	4 9 0
Do. 4½% Pref.	5	4½	4½	5½	—	3 16 8
India-Rubber Preferred	1	—	5½	1½xd	+6d.	4 17 9
Johnson & Phillips	1	5	7½	41/3	—	3 12 9
Siemens Ord.	1	6½	4	22/6	–1/16	3 11 1
Telegraph Construction	£1	Nil	Nil	23/9	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933.

20856. "Circuits for discharge lamps." P. Friedman. August 18th, 1934. (435025.)

34653. "Electric conductors." Siemens & Halske Akt.-Ges. December 10th, 1932. (435027.)

35310. "Television, telekinematographic, and like systems, and apparatus therefor." J. L. Baird and Baird Television, Ltd. December 15th, 1933. (435103.)

1934.

3673. "Receiving method and arrangement, more particularly for television purposes." M. Von Ardenne. February 6th, 1933. (434950.)

3776. "Television and like systems." A. D. Blumlein. February 5th, 1934. (434876.)

4613. "Safety device for electric welding machines having a cooling-fluid circulation system." D. Sciaky. February 14th, 1933. (435031.)

6665. "Electric plug-and-socket couplings." G. H. Scholes & Co., Ltd., G. H. Scholes and F. J. Pearce. March 2nd, 1934. (434807.)

7292. "Protective arrangements for electric distribution systems." Automatic Electric Co., Ltd., G. A. Burns and T. R. Rayner. March 7th, 1934. (434952.)

7422. "Vapour electric convertors." General Electric Co., Ltd., and H. H. Taylour. March 8th, 1934. (434879.)

7436. "Thermionic-valve circuit arrangements and thermionic valves for use therein." Telefunken Ges. für Drahtlose Telegraphie. March 8th, 1933. (434818.)

7464. "Electrical power systems." A. Tustin and Associated Electrical Industries, Ltd. March 8th, 1934. (434880.)

7627. "Electrically heated cabinets, particularly for use in sterilising." W. F. Mitchell. March 10th, 1934. (435035.)

7653. "Warning signals for level crossings for railways and the like." W. S. Roberts and Railway Signal Co., Ltd. March 10th, 1934. (435036.)

7658. "Wave filters." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). March 10th, 1934. (434819.)

7695. "Audio-frequency transformers." Marconi's Wireless Telegraph Co., Ltd., and H. J. Round. March 10th, 1934. (435038.)

7696. "Thermionic-valve apparatus for use of very short wave lengths." Marconi's Wireless Telegraph Co., Ltd., N. E. Davis, E. Green and A. W. Hall. March 10th, 1934. (434821.)

7697. "Inductance coils." Marconi's Wireless Telegraph Co., Ltd., and W. A. Appleton. March 10th, 1934. (434822.)

7718. "Electrical measuring bridge for the measurement of earth resistances." Telefonaktiebolaget L. M. Ericsson. March 16th, 1933. (434823.)

7790. "Television systems." Marconi's Wireless Telegraph Co., Ltd. April 8th, 1933. (434882.)

8069. "Automatic voltage regulators." General Electric Co., Ltd., G. E. Davis and J. W. Gibson. March 14th, 1934. (434884.)

8079. "Electrolytic cells." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 25th, 1933. (435112.)

8165. "Centrifugal fans for use with dynamo-electric machines." C. A. V. Bosch, Ltd., and W. H. Glaser. March 15th, 1934. (435118.)

8166. "Dynamo regulators." C. A. V. Bosch, Ltd., and J. W. Pletts. March 15th, 1934. (435119.)

8199. "Contacts for electric oil switches." British Thomson-Houston Co., Ltd. March 15th, 1933. (434885.)

8348. "Microphones." Standard Telephones & Cables, Ltd. May 11th, 1933. (435130.)

8349. "High-frequency electric transmission circuits." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). March 16th, 1934. (435131.)

8550. "Interference eliminator for wireless receivers." E. Bohm and J. Nussbaum. March 19th, 1934. (435135.)

8815. "Electrical transmission, particularly for traction machines." J. Sousedik. April 12th, 1933. (435136.)

9087. "Automatic time-release devices." I. Braithwaite & Son, Engineers, Ltd., and W. H. Stilling. March 23rd, 1934. (434887.)

9218. "Electric resistance heaters for agricultural and other purposes." N. R. Davis. March 23rd, 1934. (435055.)

9698. "Electric cables." Pirelli-General Cable Works, Ltd., and J. R. Harding. March 28th, 1934. (435140.)

10504. "Sound, television and like transmission systems." Marconi's Wireless Telegraph Co., Ltd. April 8th, 1933. (434890.)

10678. "Primary cells." Soc. Anon. le Carbone. December 12th, 1933. (435141.)

10692. "Television, sound, and like communication systems." Marconi's Wireless Telegraph Co., Ltd. April 8th, 1933. (434891.)

11222. "Electric oil circuit-breakers." C. H. Flurscheim and Associated Electrical Industries, Ltd. April 13th, 1934. (Cognate application 34892/34.) (435143.)

14526. "Combined electric switch and socket units." General Electric Co., Ltd., and H. Jacobs. May 14th, 1934. (435062.)

15784. "Electric lamps for cycles." W. J. Hill. May 28th, 1934. (434974.)

19184. "Electric regulating switches." General Electric Co., Ltd., and H. C. Hannam-Clark. June 29th, 1934. (434989.)

20482. "Electric drives for machines or machine parts working with a constant speed ratio." British Thomson-Houston Co., Ltd. July 12th, 1933. (434899.)

21520. "Electric switching, indicating, and/or alarm apparatus" R. A. Lovibond. July 23rd, 1934. (434848.)

22461. "Radio and like receivers." Marconi's Wireless Telegraph Co., Ltd. August 1, 1933. (434902.)

22670. "Synchronous electric drives." Allmänna Svenska Elektriska Aktiebolaget. February 8th, 1934. (434903.)

22790. "Electric heating resistance." H. Von Kantzow. August 4th, 1934. (434849.)

22869. "Television transmission." General Electric Co., Ltd., and L. C. Jesty. August 7th, 1934. (434905.)

23053. "Current transformers." Siemens & Halske Akt.-Ges. August 9th, 1933. (434995.)

24135. "Coupling of high-frequency oscillation circuits." General Electric Co., Ltd., and E. C. S. Megaw. August 21st, 1934. (435153.)

24254. "Level-crossing signalling arrangements." Naamlooze Vennootschap Machinerieen-en Apparaten Fabrieken Meaf. August 22nd, 1933. (Addition to 426870.) (434997.)

24472. "Receiver of electrical currents for remote control." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. September 7th, 1933. (434998.)

26392. "Telephone systems." Standard Telephones & Cables, Ltd., E. P. G. Wright, and G. C. Hartley. March 16th, 1934. (Divided out of 8350/34.) (435155)

27519. "Course-indicating instruments for use on aircraft equipped with radio receivers for co-operation with so-called wireless lighthouses." Telefunken Ges. für Drahtlose Telegraphie. September 26th, 1933. (435072.)

27763. "Electric telephone cables for four-wire circuit operation." Siemens & Halske Akt.-Ges. October 2nd, 1933. (434855.)

30249. "Toy electric motors." A. Jones. October 22nd, 1934. (435157.)

30634. "Induction furnace with an open iron yoke." Siemens & Halske Akt.-Ges. November 1st, 1933. (434909.)

30883. "Lighting systems." British Thomson-Houston Co., Ltd. October 28th, 1933. (434857.)

35846. "Track brake magnets." Knorr-Bremse Akt.-Ges. October 22nd, 1934. (434862.)

37387. "Supply units for wireless receiving sets, amplifiers, and the like." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 26th, 1934. (434914.)

37389. "Supply of electric discharge tubes excited inductively." Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares Etablissements Claude-Paz & Silva. October 17th, 1934. (434915.)

1935

547. "Electrical connecting devices, particularly for telephone cable test boxes." Standard Telephones & Cables, Ltd., and J. A. Leno. January 7th, 1935. (435159.)

585. "Electric hot-water heaters, electric geysers, and like liquid heaters." B. J. Bennett. January 8th, 1935. (435160.)

2541. "Mercury vapour lamp, more particularly for projection purposes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 15th, 1934. (434919.)

3857. "Cathode-ray tubes for the production of pictures in natural colours, particularly for television and like systems." Fernseh Akt.-Ges. March 6th, 1933. (Divided out of 7164/34.) (434868.)

7534. "Intermediate-film television and like systems." Fernseh Akt.-Ges. March 10th, 1934. (434873.)

9701. "Voltage regulating arrangements for converting systems using gaseous or vapour electric discharge devices." British Thomson-Houston Co., Ltd. March 28th, 1934. (Addition to 390196.) (434928.)

9727. "Light-valves." Electrical Research Products, Inc. April 5th, 1934. (Addition to 382663.) (434929.)

11408. "Electric lighting apparatus for use on bicycles and the like." Aga-Baltic Radio Aktiebolag. July 28th, 1934. (435094.)

11980. "Picture-receiving apparatus." Electrical Research Products, Inc. April 20th, 1934. (434933.)

12472. "Means for joining electric current conductors." C. H. Jaspar. June 20th, 1934. (435020.)

12808. "Television and like transmitters." Marconi's Wireless Telegraph Co., Ltd. April 28th, 1934. (434936.)

13018. "Electron discharge device circuit arrangements." Soc. Française Radio-Electrique. May 15th, 1934. (434938.)

14169. "Methods of manufacturing photo-electric electrodes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 26th, 1934. (435169.)

15170. "Cathode-ray tubes and television and like transmitters incorporating the same." Marconi's Wireless Telegraph Co., Ltd. May 24th, 1934. (434942.)

16931. "Electric drives." Allmänna Svenska Elektriska Aktiebolaget. February 8th, 1934. (Divided out of 434903.) (434947.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 2nd:—

Arca. No. 561700. Class 6. Regulators and governors.—British Arca Regulations, Ltd., Windsor House, Victoria Street, Westminster, S.W.1.

Trans-Lux (lettering and design). No. 557571. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Trans-Lux Daylight Picture Screen Corporation, New York. (British representatives: Stevens, Langner, Parry and Rollison, 5-9, Quality Court, Chancery Lane, W.C.2.).

Ever Ready Radio (lettering and design). No. 561994. Class 8. Dry batteries, cells and accumulators (electrical) not for medical purposes.—Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, N.7.

Challenger. No. 560279. Class 8. Electric batteries (not for medical purposes).—Frank Riddihough & Son, 10, Lee Street, Thornton Road, Bradford.

Valvete. No. 561445. Class 11. Apparatus for use in ameliorating deafness.—Multitone Electric Co., Ltd., 95-98, White Lion Street, Islington, N.1.

Rectalux. No. 560573. Class 13. Electric lamps and electric light fittings.—Philips Gloeilampenfabrieken Maatschappij, Eindhoven, Holland. (British representatives: Dicker, Pollak, Mercer, Tench and Meyer, 20-23, Holborn, E.C.1.).

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Anstey (Rugby).—Aerodrome; Armstrong Siddeley Co., Ltd., Coventry.

Ashby-de-la-Zouch.—Council offices; Goddard & Wain, Station Chambers, High Street, Coalville.

Ayrshire.—Primary school, Kilmarnock (electrical work); W. Reid, county architect, Ayr.

Bagillt (North Wales).—Houses (70), near Sandy Lane (electrical work); A. Snape, builder, Chester Road, Flint.

Barking.—Flats, Tanner Square and Upton Lane (£25,450), and shops (8), Axe Street (£10,000); borough engineer.

Barnard Castle.—Houses (electrical work); U.D.C. surveyor.

Bath.—Houses (128), Shophouse Road; city engineer.

Bedale (Yorks).—Institute, Hackworth; Weatherell, Dent & Pickersgill, architects, High Row Chambers, Richmond.

Birmingham.—New rolling mills in St. Anne's Road; B.M. Rolling Mills, Ltd.

Blyth.—Houses (212); Mr. Carse, Malvins Close.

Bolton (Lancashire).—Houses (128) on the Willows estate (£38,500), extensions to isolation hospital and nurses' home (£81,500) and fire station (£35,000); borough engineer. Reconstruction of 102-112, Chorley Street; H. Taylor. Works extension at Grosvenor Street; J. Bentley, Ltd.

Bournemouth.—Baths (£69,950); Hawkins Bros.

Brecknockshire.—Extensions, including gymnasium to Vaynor and Penderyn secondary school, Cefn Coed; H. C. W. Strickland, county architect, Watton Offices, Brecon.

Bridgwater (Somerset).—Re-erection of stores at St. Mary Street (£20,000); Buchier Bros.

Bristol.—Cinema and ballroom (£35,000) at Bedminster; W. H. Watkins, architect, Provident Buildings, 15, Clare Street.

Bromborough.—Works at South Shore Road; Fawcett Preston & Co., Ltd., Liverpool.

Chelmsford.—Houses (32), at Campbell Close; J. A. Thoday. Houses (42) at Millfield estate; Waverley Building Co., Ltd. Senior school (750 places) at Moulsham; H. W. Allardyce, architect, Barking.

Chertsey.—Houses (100) on the Fernlands Hall estate; G. Hollis (Builders), Ltd.

Chester.—Houses (226), on the Lache estate (£72,005); G. H. Heywood, Ltd.

Clydebank.—New factory for United Co-operative Baking Society (£40,000); Baillie R. G. Yates, director.

Dalkeith.—Houses (56), for the T.C.; T. Ackman Swan, 7, St. Colme Street, Edinburgh.

Darfield (Yorkshire).—Houses (38) in Barnsley Road; U.D.C. surveyor.

Darton (Yorkshire).—Houses (34) at Kexborough; U.D.C. surveyor.

Dewsbury.—School at Temple Road (600 places); director of education.

Dumfriesshire.—Houses (58) at Kelloholm, Kirkconnel (electrical work); J. Robson, county clerk, Dumfries.

Dunstable.—Cinema for Vogue Cinemas, Ltd.; J. McKissack & Son, architects, 68, West Regent Street, Glasgow.

Durham.—Alterations to the public library (£1,300); W. J. Greene, city engineer. Schools at Crook (£28,000), Shotton, Pittington and Shiney Row; F. Willey, architect, 34, Old Elvet, Durham.

Eastbourne.—Cinema at Green Street; P. D. Stonham & Son, Hadley House, Upperton Road.

East Ham.—Factory at 636, Romford Road; T. W. Palmer & Co., Merton Abbey Ironworks, S.W.19.

Ellesmere.—Milk factory; United Dairies (Wholesale), Ltd.

Emsworth.—Houses (50) at Victoria Road; J. P. Hounsell, builders, Denmead.

Enfield.—Fire brigade headquarters (£35,789); Allen Fairhead & Sons, Ltd.

Fifeshire.—Hall and improvements at church for St. Martin's congregation, Strathmiglo; Rev. G. Scanlan, minister, Strathmiglo.

Great Malvern.—Cinema, for D. & D. Cinemas, Ltd.; E. S. Roberts, architect, Lombard House, Great Charles Street, Birmingham.

Hastings.—Additions to the Royal East Sussex Hospital; Callow & Callow, architects, 47, Havelock Road.

Hendon.—Extensions for Franco-British Electric Co.; A. E. A. Stone & Partners, 20, Berkeley Street, W.1.

Hereford.—Houses (97) on the Hinton estate (£31,767); Copp Bros., Ltd. Institute in Bulmer Avenue; Hereford Co-operative Housing, Ltd. Warehouse in Kyrle Street; H. Skyrme.

Hertfordshire.—School at Barnet; W. Fraser Granger, architect, 9, Saville Row, W.1.

High Wycombe.—Houses at Desborough (£63,896); J. Eadie & Co., builders, Wolverhampton. School in Mill End Road (£47,220); director of education.

Holmer (Hereford).—Houses (107) at Westfield; W. J. James, Leominster.

Irish Free State.—(Clare).—County fever hospital (£39,000); Board of Health. (Wexford).—Hospital (£90,000); County Health Board.

Ilkeston.—Extensions to Kensington school (£3,208); J. Cooper. Houses (74), off Hobson Drive; Hopkins & Metcalfe.

Leeds.—Cinema and shops at St. Anne's and Otley Roads; Pickersgill's Estate Co. Development of Moorfield House estate, Grove Lane, Headingley; Pickard & Co., Ltd. Houses (64) and flats on the Hawkswood estate (£13,306); Tarran Industries, Ltd. Houses and flats on the Torre estate; city architect. Police and fire stations on Gilton estate (£26,495); J. H. Wood and Co., Ltd. Transport depôt at Torre Road (£41,790); city architect.

Leominster (Hereford).—Cinema for D. & D. Cinemas, Ltd.; E. S. Roberts, architect, Lombard House, Great Charles Street, Birmingham.

Lerwick.—Houses (235) for T.C.; W. W. Reed, Town Hall.

Liverpool.—Extension and new factory for Britains, Ltd., at Sefton Road, Walton.

London.—(E.1).—Extensions to Godfrey Phillips, Ltd., Commercial Road; Bernard W. H. Scott, architect. (E.3).—New factory for Steel Ceilings, Ltd., 415, Old Road. (Hammersmith).—Town hall at Brook Green; borough architect. (S.E.5).—Extensions for H. S. Whiteside & Co., Parkhouse Street; G. Parker & Sons, Ltd., contractors. (Sydenham).—Factory at 392-400, Sydenham Road; G. B. Cotton & Co., Ltd., 402, Sydenham Road, North Croydon. (W.13).—Factory in Great West Road; R. B. Pullin & Co., Ltd., Seaford, W.13. (West Ham).—Houses (30) at Stratford; P. Gallagher, Ltd., builders. (Woolwich).—Extensions to War Memorial Hospital (£50,000); W. Pite, Son & Fairweather, 12, Carteret Street, S.W.1.

Manchester.—Extensions to works, for Roto, Ltd., Alexandra Street, Collyhurst (electrical work); W. Rooks & Sons, builders, 109, Needwood Street, Collyhurst. Four-storey building, Peter Street; H. S. Abram & Son, 19, Buckingham Street, London, S.W.1. Houses at Blackley and Newton Heath (£57,373); city architect.

Market Harborough.—New works for K. F. Kirby, Ltd.; A. Coales & Green, 36, High Street.

Merionethshire.—Secondary school, Barmouth (£14,000), for County E.C.

Middlesbrough.—Houses (50) on the Brambles Farm estate; J. McCreton, Ltd., builders, West Terrace, North Ormesby. Houses at St. Mary's Walk; G. C. and T. Duncanson, builders, Beechwood, Acklam.

Northumberland.—Mental home at Northgate; W. W. Tasker, county architect, County Hall, Newcastle-upon-Tyne. Senior school at Gosforth; A. Anderson, builder, Sutton Street, Newcastle-upon-Tyne.

Oldham.—Houses (174) and bungalows on Stoneleigh Hall estate (electrical work); J. Ashurst, borough engineer.

Oxford.—Houses (115) on the Wolvercote estate; J. F. Richardson, city engineer.

Paisley.—Extensions to Municipal Buildings; J. Lee, burgh surveyor, Municipal Buildings.

Peterborough.—Admission hospital, nurses' home, &c. (£50,000); H. Russell, county surveyor.

Pickering (Yorkshire).—Houses (34) at Thornton Dale; C. Smallwood, Scarborough.

Queensbury.—Cinema for General Cinema Theatres, Ltd.; C. Masey, 15, Caroline Street, London, W.C.1.

Rawtenstall.—Extensions to Lower Mill; D. Whitehead & Sons.

Rotherham.—Houses (268); borough surveyor.

Rustington (Sussex).—Hotel and lido (£50,000) in Broadmark Road (electrical work); W. J. Jones, Manor Park Construction Co., Ltd.

Salford.—Bus station (£34,500); borough engineer. Flats (292) in the Ordsall area; city surveyor. Senior schools (£50,000) at Broughton; P. Howard, architect.

Sheffield.—Houses (32) in Hinde House Lane; J. Copley & Sons. Houses (25), Sharrow Lane; Allsop & Marshall. Houses (248), Shirecliffe estate (£78,880); Melling Bros., Ltd. New works for Weardens & Grylee, Ltd., Bradford.

Shenfield (Essex).—Cinema, Southend Road; G. A. Joslin, architect, 5, St. Thomas Street, Brentwood.

Slough.—Factories at Montrose Avenue and Berwick Avenue; Slough Estates, Ltd. Municipal offices (£29,000); H. Tyson Chambers, Ltd., builders, Bedford Avenue, Slough Trading Estate.

Smethwick.—Extensions to works in Bridge Street; Smethwick Stamping Co., Ltd. Extensions to works in Dartmouth Road; Midland Motor Cylinder Co., Ltd. Extensions to works in Foundry Lane; W. & T. Avery, Ltd. Extensions to factory in Wills Street; Hill's Patent Glazing Co., Ltd. Senior school on the Smethwick Hall site; borough engineer.

South Shields.—Houses (56), in Wenlock Road; J. Reid, borough engineer.

Tynemouth.—Reconstruction of premises of Gilbert Park & Son in Hudson Street and Tynemouth Road; W. Stockdale, architect. Shops and houses in Billy Mill Avenue and Lyncroft Road; F. R. N. Haswell & Son, architects.

Wallsend-on-Tyne.—Houses (95) on the Westmorland estate; W. Turner, builder, Walkerville, Newcastle-upon-Tyne. Houses and shops in Tynemouth Road; W. Riddle, architect, 53, Denham Terrace. Public library (£13,500); borough engineer. Premises on the Coast Road for the Wallsend Industrial Co-op. Society, Carville Road.

West Riding.—Schools at Wickersley; education architect, Wakefield.

Wick.—Houses (50) for T.C.; W. Will, burgh surveyor, Town House. Cinema (600 seats); R. Pert & Sons, contractors, Montrose.

Wolverhampton.—Estate development at Bhylls Lane; A. Silverstone & Co. Extensions to stores, with lifts, for James Beattie, Ltd.; Wilson Lovatt & Sons, Ltd., builders. Houses (65), on the Marston Road estate; Marston-Fellowes, Ltd. School at Stafford Street (£25,000); Education Committee.

Worcestershire.—Senior schools (480 places), Pedmore Road, Stourbridge; A. W. Priestley, director of education, Worcester.

Workington.—Development of Laverock Hall and Moor Close estates; James Leslie & Son. Houses (50) on the Salterbeck estate; T. Armstrong, Ltd.

Worksop.—Central Library and museum; Leverton & Brown, builders, Watson Road.

York.—Church, New Earswick (£8,000); Rev. H. Varley. Schools, Osbaldwick Lane (400 places); city engineer. Cinema in Blossom Street; Odeon Co., Ltd., Birmingham.